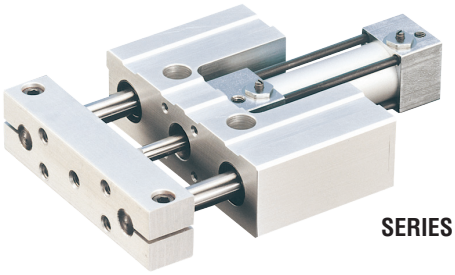
# SD, SE

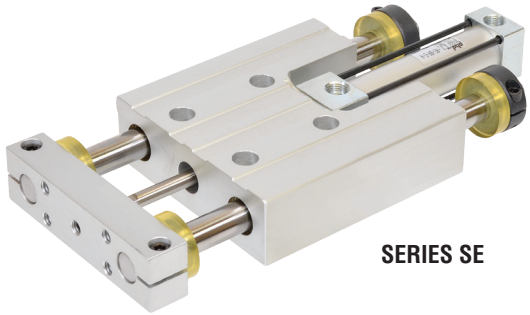
## Major Benefits

- Offered in short or long body
- Can be ordered with standard or oversize shafts
- Standard dowel pin holes for ease of mounting
- Several switch options
- Five bore sizes
- Versatile unit with more than 45 standard options



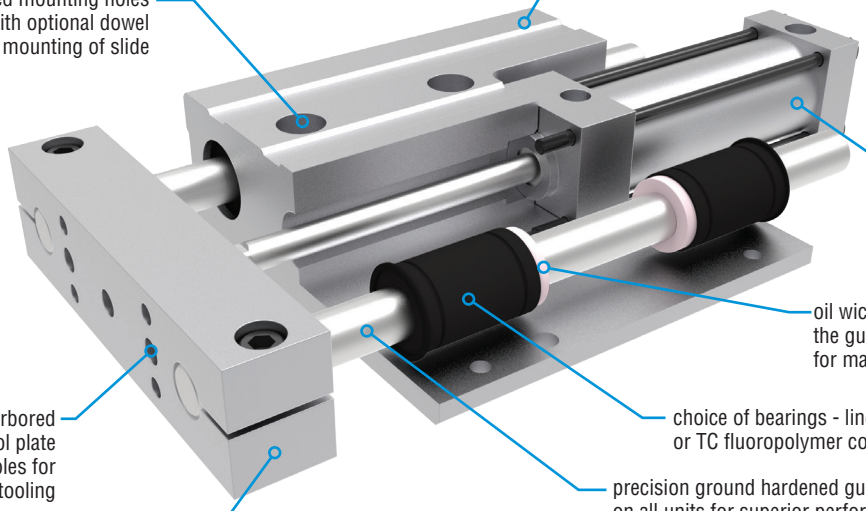
**SERIES SD**

*The SD version is compact and ideal for short travel in horizontal or vertical application, where slide length and weight are critical.*



**SERIES SE**

*The SE version has a greater distance between bushings for longer slide travels and greater shaft stability.*



# ORDERING DATA: Series SD/SE Slides - Basic Model

**TO ORDER SPECIFY:**
Product, Series, Type, Three Position, Slide Size, Slide Travel, Mid-PositionTravel, Tool Plate Extension, and Options.

**PRODUCT**
S - Slide

**SERIES**
D - Short Body
E - Long Body

**THREE POSITION UNIT**
(specify only if needed)

**TOOL PLATE EXTENSION**
Additional distance between tool plate and bearing block in 1" increments. Leave blank if no additional extension is required.
(specify only if needed)

| S | E | B | E | 25 | x | 2-1/4 | x | 1-1/8 | x | 1 |
|---|---|---|---|---|---|---|---|---|---|---|

**SLIDES WITH TC COMPOSITE BUSHINGS**

| TYPE | SLIDE SIZE | SHAFT SIZE DIA. | CYLINDER BORE | EFF. AREA (EXTENSION) |
|---|---|---|---|---|
| C | 22 | 3/8" | 3/4" | 0.44 |
| D | 22 | 1/2" (oversize) | 3/4" | 0.44 |
| C | 23 | 1/2" | 1" | 0.78 |
| D | 23 | 5/8" (oversize) | 1" | 0.78 |
| C | 24 | 5/8" | 1-1/8" | 0.99 |
| D | 24 | 3/4" (oversize) | 1-1/8" | 0.99 |
| C | 25 | 3/4" | 1-3/8" | 1.48 |
| D | 25 | 1" (oversize) | 1-3/8" | 1.48 |
| C | 26 | 1" | 2" | 3.14 |
| D | 26 | 1-3/8" (oversize) | 2" | 3.14 |

**SLIDES WITH LINEAR BALL BUSHINGS**

| TYPE | SLIDE SIZE | SHAFT SIZE DIA. | CYLINDER BORE | EFF. AREA (EXTENSION) |
|---|---|---|---|---|
| B | 22 | 3/8" | 3/4" | 0.44 |
| B | 23 | 1/2" | 1" | 0.78 |
| B | 24 | 5/8" | 1-1/8" | 0.99 |
| B | 25 | 3/4" | 1-3/8" | 1.48 |
| B | 26 | 1" | 2" | 3.14 |

**SLIDE TRAVEL (in)**

**SIZE SERIES D**
22 - 1/4 to 12
23 - 1/4 to 14
24 - 1/4 to 18
25 - 1/4 to 18
26 - 1/4 to 22

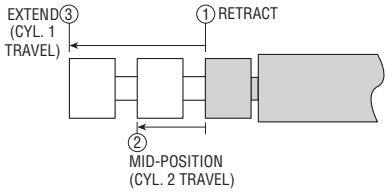
**SIZE SERIES E**
22 - 1/4 to 16
23 - 1/4 to 18
24 - 1/4 to 24
25 - 1/4 to 24
26 - 1/4 to 28

Available in 1/4" increments. Consult factory for longer travel lengths.

**3 POSITION SLIDES**
Total slide travel from retract position 1 to extend position 3.

**MID-POSITION TRAVEL**
Specify for 3 position units.
Travel from retract position 1 to mid-position 2.

**3 POSITION DETAIL**




Options may affect unit length. See dimensional pages and option information details.

## SERIES JC1xDx MAGNETIC SWITCHES

| PART NO. | DESCRIPTION |
|---|---|
| JC1RDU-5 | PNP or NPN DC Reed, 5 meter cable |
| JC1RDU-K | PNP or NPN DC Reed, Quick Connect |
| JC1ADU-K | AC Reed, Quick Connect (M12) |
| JC1HDP-5 | PNP (Source), Radial Sensing, 5 meter cable |
| JC1HDP-K | PNP (Source), Radial Sensing, Quick Connect |
| JC1HDN-5 | NPN (Sink), Radial Sensing, 5 meter cable |
| JC1HDN-K | NPN (Sink), Radial Sensing, Quick Connect |

**NOTE:** Switches must be ordered separately.

## CORDSETS FOR SERIES JC1xDx SWITCHES

| PART NO. | DESCRIPTION |
|---|---|
| 63549-02 | M8, 3 pin, Straight Female Connector, 2 meter cable |
| 63549-05 | M8, 3 pin, Straight Female Connector, 5 meter cable |
| 81284-1-010 | M12, 4 pin, Straight Female Connector, 2 meter cable |

**NOTE:** Cordsets are ordered separately.

## JC1 SWITCH MOUNTING BRACKET

| SLIDE SIZE | BRACKET NO. |
|---|---|
| 22 | 92100 |
| 23 | |
| 24 | |
| 25 | 92101 |
| 26 | |

**NOTE:** Brackets are ordered separately.

## SERIES JC1ST TWO POSITION TEACHABLE MAGNETIC SWITCHES

| PART NO. | DESCRIPTION |
|---|---|
| JC1STP-2 | PNP (Source), Solid State, 12-30 VDC, 2 meter cable |
| JC1STP-K | PNP (Source), Solid State, 12-30 VDC, Quick Connect |

**NOTE:** Switches must be ordered separately.

## CORDSET FOR SERIES JC1ST SWITCHES

| PART NO. | DESCRIPTION |
|---|---|
| 81284-1-001 | M8, 4 pin, Straight Female Connector, 5 meter cable |

**NOTE:** Cordsets are ordered separately.



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**SHOCK ABSORBER OPTIONS**

GM - Provisions for Shock Absorber mounting on extension*
GN - Provisions for Shock Absorber mounting on retraction*
GO - Provisions for Shock Absorber mounting on extension and retraction*
G2 - Shock Absorber and 8 mm Proximity Switch Ready on extension and retraction*
G3 - Shock Absorber and 8 mm Proximity Switch Ready on extension*
G4 - Shock Absorber and 8 mm Proximity Switch Ready on retraction*
G12 - Shock Absorber and 12 mm Proximity Switch Ready on extension and retraction*
G13 - Shock Absorber and 12 mm Proximity Switch Ready on extension*
G14 - Shock Absorber and 12 mm Proximity Switch Ready on retraction*
BK - HushStop on extension for use with appropriate shock absorber option -Gx
BL - HushStop on retraction for use with appropriate shock absorber option -Gx
BS - Shock Pads on extension for use with option -GM, -GO, -G2, -G3, -G12, or -G13 only*
BT - Shock Pads on retraction for use with option -GN, -GO, -G2, -G4, -G12, or -G14 only*

**- PB - AR - GM – BS**

**OPTIONS**

PB - Port Controls® on extension and retraction*
DB - Adjustable Cushions on extension and retraction*
U7 - Ports and control needles in position 3 (180° from standard)
E - Magnetic piston for radial sensing switches
M - Magnetic piston for reed and teachable switches
BR - Shock Pads on retraction*
BJ - HushStop on retraction*
GV - Side mounting holes in position 2
H1 - Slide only, no cylinder
H4 - Replacement cylinder only (see note 7)
H47 - Rodlok unit preassembled (see note 7)
J1 - Close fit dowel pin holes in the tool plate
J2 - Normal fit dowel pin holes in the tool plate
J6 - Normal fit dowel pin holes in the body. Close fit dowel pin holes are standard in the body
L10 - Oversize ports (sizes 25 & 26 only)
Q1 - Corrosion resistant guide shafts
V1 - Fluoroelastomer Seals
Z1 - Electroless nickel plate on all external ferrous parts excluding piston rod, rod end, and guide shafts

**SHOCK PADS**

| STANDARD | HUSHSTOP | GENERAL SLIDE OPTIONS |
|---|---|---|
| AR | AT | - Travel Adjustment and Shock Pads on retraction* |
| AE | AS | - Travel Adjustment and Shock Pads on extension* |
| GG | G22 | - Travel Adjustment and Shock Pads on extension with provisions for Proximity Switch mounting in both directions* |
| GH | G23 | - Travel Adjustment and Shock Pads on retraction with provisions for Proximity Switch mounting on retract only* |
| GI | G24 | - Travel Adjustment and Shock Pads with provisions for Proximity Switch mounting in both directions* |

**NOTES:**

1) Shock absorbers must be ordered separately. See option pages. Shock mounting brackets must be ordered separately for -GM, -GN, and -GO option.
2) Provisions for shock absorber mounting options include shock stops mounted on the shaft, a stop collar on the opposite shaft, and threaded holes in the slide body for mounting the shock bracket.
3) For stop and travel adjustment kits, see option pages or chart below.
4) BJ, -BR and -GG options not available with tool plate extension.
5) Proximity switches and brackets must be ordered separately for -GG, -GH, -GI, -GM, -GN, or -GO options. See option pages and the Switches and Sensors section.
6) For HushStop options (AS, AT, BJ, BK, BL, G22, G23, & G24) stop locations may vary due to compression of softer shock pad.
7) Rodlok must be ordered separately when a replacement cylinder -H4 is ordered with an -H47 unit.
8) ***CAUTION:** Unit dimensions are affected by these options. You must allow for these changes. See option drawings for complete details. Shock pads come standard with the travel adjustment options and do not need to be specified separately when travel adjustment is ordered.

**PROXIMITY SWITCHES**

| PART NO. | DESCRIPTION |
|---|---|
| 51422-005-02 | 8 mm Inductive Proximity Switch NPN (Sink), 10-30 VDC, 2 m cable |
| 51422-006-02 | 8 mm Inductive Proximity Switch PNP (Source), 10-30 VDC, 2 m cable |

See Switches and Sensors section for switch details. Switches and brackets are ordered separately.

**PROXIMITY SWITCH BRACKET AND TARGET KITS**

| SLIDE SIZE | SWITCH SIZE | |
|---|---|---|
| | 8 mm | 12 mm |
| 22 | 53101-01-1 | 63998-01-1 |
| 23 | 53101-01-1 | 63998-01-1 |
| 24 | 53101-02-1 | 63998-02-1 |
| 25 | 53101-02-1 | 63998-02-1 |
| 26 | 53101-03-1 | 63998-03-1 |

Kit contains all components for standard non-Z1 unit for one direction only.

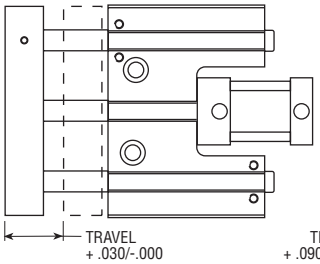
| SPECIFICATIONS | SERIES SD/SE |
|---|---|
| OPERATING PRESSURE | 20 psi min to 150 psi max [1.4 bar min to 10 bar max] air |
| OPERATING TEMPERATURE | -20° to +180°F [-29° to +82°C] |
| TRAVEL TOLERANCE | Nominal travel, +0.030/-0.000 in [+0.76/-0.0 mm] |
| TOOL PLATE EXTENSION | +0.090/-0.000 in [+2.3/-0.0 mm] |
| 3-POSITION | Mid-location ±0.030 in [0.76 mm] |
| REPEATABILITY | ±0.001 in [±0.025 mm] of original position |
| VELOCITY | |
| WITHOUT PORT CONTROLS | 50 in/sec [1.3 m/sec] max., zero load at 100 psi [6.9 bar] |
| WITH OPTION -PB | 16 in/sec [0.4 m/sec] max., zero load at 100 psi [6.9 bar] |
| LUBRICATION | Factory lubricated for life |
| MAINTENANCE | Field repairable |

| SIZE | TYPE | SHAFT DIAMETER | | BORE DIAMETER | | EFFECTIVE AREA | | | SERIES SD BASE WEIGHT | | SERIES SE BASE WEIGHT | | TRAVEL WEIGHT ADDER | | TYPICAL DYNAMIC LOAD | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | in | mm | in | mm | DIRECTION | in² | mm² | lb | kg | lb | kg | in/lb | kg/mm | lb | N |
| 22 | B | 0.375 | 9.5 | 0.750 | 19.1 | EXTEND | 0.44 | 285 | 1.59 | 0.72 | 2.38 | 1.08 | 0.10 | 0.002 | 8 | 36 |
| | C | 0.375 | 9.5 | | | RETRACT | 0.39 | 254 | 1.59 | 0.72 | 2.38 | 1.08 | 0.10 | 0.002 | | |
| | D | 0.500 | 12.7 | | | | | | 1.66 | 0.75 | 2.55 | 1.16 | 0.15 | 0.003 | | |
| 23 | B | 0.500 | 12.7 | 1.000 | 25.4 | EXTEND | 0.79 | 506 | 3.25 | 1.47 | 4.6 | 2.10 | 0.18 | 0.003 | 15 | 67 |
| | C | 0.500 | 12.7 | | | RETRACT | 0.71 | 457 | 3.25 | 1.47 | 4.6 | 2.10 | 0.18 | 0.003 | | |
| | D | 0.625 | 15.9 | | | | | | 3.27 | 1.48 | 4.8 | 2.17 | 0.25 | 0.004 | | |
| 24 | B | 0.625 | 15.9 | 1.125 | 28.6 | EXTEND | 1.00 | 642 | 4.70 | 2.13 | 6.4 | 2.88 | 0.28 | 0.005 | 25 | 111 |
| | C | 0.625 | 15.9 | | | RETRACT | 0.88 | 570 | 4.70 | 2.13 | 6.4 | 2.88 | 0.28 | 0.005 | | |
| | D | 0.750 | 19.1 | | | | | | 4.75 | 2.15 | 6.5 | 2.95 | 0.35 | 0.006 | | |
| 25 | B | 0.750 | 19.1 | 1.375 | 34.9 | EXTEND | 1.49 | 958 | 8.57 | 3.89 | 11.7 | 5.31 | 0.42 | 0.007 | 35 | 156 |
| | C | 0.750 | 19.1 | | | RETRACT | 1.29 | 832 | 8.57 | 3.89 | 11.7 | 5.31 | 0.42 | 0.007 | | |
| | D | 1.000 | 25.4 | | | | | | 8.74 | 3.96 | 12.3 | 5.58 | 0.62 | 0.011 | | |
| 26 | B | 1.000 | 25.4 | 2.000 | 50.8 | EXTEND | 3.14 | 2026 | 16.57 | 7.52 | 23.7 | 10.73 | 0.70 | 0.012 | 50 | 223 |
| | C | 1.000 | 25.4 | | | RETRACT | 2.84 | 1829 | 16.57 | 7.52 | 23.7 | 10.73 | 0.70 | 0.012 | | |
| | D | 1.375 | 34.9 | | | | | | 17.55 | 7.96 | 25.8 | 11.72 | 1.07 | 0.019 | | |

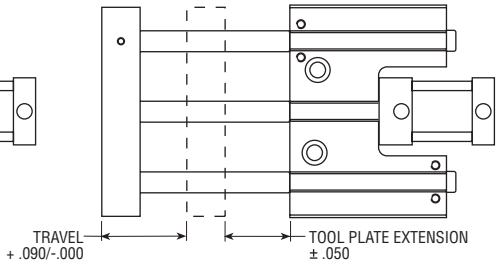
**NOTE:** Thrust capacity, allowable mass, and dynamic moment capacity must be considered when selecting a slide. Refer to PHD's sizing software or pages 2-63 through 2-73 for complete sizing and selection information.

## TOLERANCES

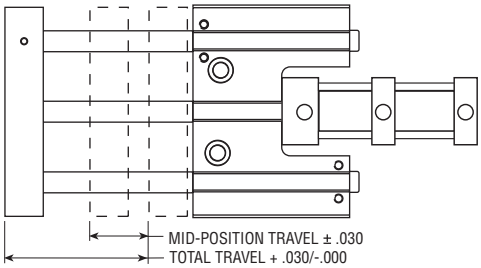
**STANDARD UNIT**




**UNIT WITH TOOL PLATE EXTENSION**




**3 POSITION UNIT**




**CYLINDER FORCE CALCULATIONS**

| | Imperial F = P x A | Metric F = 0.1 x P x A |
|---|---|---|
| F = Cylinder Force | lbs | N |
| P = Operating Pressure | psi | bar |
| A = Effective Area (Extend or Retract) | in² | mm² |

## Application & Sizing Assistance

Use PHD's free online Product Sizing and Application at **www.phdinc.com/apps/sizing**

## SLIDE SELECTION

There are three major factors to consider when selecting a slide:

### 1 BUSHING LOAD CAPACITY

Use the Maximum Rolling Load Graphs (pages 45 to 50) and the Maximum Static Side Load Calculations (below) to determine if the slide bushings can handle the total payload. Bushing loads shown are based on 200 million inches of slide travel.

### 2 SHAFT DEFLECTION

Use the Deflection Graphs (pages 45 to 50) to determine if the slide has an acceptable amount of deflection for your application.

### 3 AIR CYLINDER THRUST

Use the effective piston area (see previous page) to determine if the unit has sufficient force for the load.

The charts on pages 45 to 50 provide complete sizing information.

**SD MAXIMUM LOADS & UNIT WEIGHTS**

| UNIT SIZE | SLIDE MODEL | MAX. STATIC SIDE LOAD (lb) | UNIT WEIGHT (lb) |
|---|---|---|---|
| 22 | SDD | $\frac{260}{\text{travel} + 2.73}$ | 1.66 + (0.15 x travel) |
| 22 | SDB | $\frac{57}{\text{travel} + 2.73}$ | 1.59 + (0.10 x travel) |
| 22 | SDC | $\frac{250}{\text{travel} + 2.73}$ | 1.59 + (0.10 x travel) |
| 23 | SDD | $\frac{1,000}{\text{travel} + 3.4}$ | 3.27 + (0.25 x travel) |
| 23 | SDB | $\frac{130}{\text{travel} + 3.19}$ | 3.25 + (0.18 x travel) |
| 23 | SDC | $\frac{670}{\text{travel} + 3.4}$ | 3.25 + (0.18 x travel) |
| 24 | SDD | $\frac{1,700}{\text{travel} + 3.83}$ | 4.75 + (0.35 x travel) |
| 24 | SDB | $\frac{1,280}{\text{travel} + 3.65}$ | 4.70 + (0.28 x travel) |
| 24 | SDC | $\frac{1,280}{\text{travel} + 3.83}$ | 4.70 + (0.28 x travel) |
| 25 | SDD | $\frac{2,300}{\text{travel} + 4.28}$ | 8.74 + (0.62 x travel) |
| 25 | SDB | $\frac{2,200}{\text{travel} + 4.1}$ | 8.57 + (0.42 x travel) |
| 25 | SDC | $\frac{2,200}{\text{travel} + 4.28}$ | 8.57 + (0.42 x travel) |
| 26 | SDD | $\frac{6,000}{\text{travel} + 5.84}$ | 17.55 + (1.07 x travel) |
| 26 | SDB | $\frac{5,400}{\text{travel} + 5.56}$ | 16.57 + (0.70 x travel) |
| 26 | SDC | $\frac{5,400}{\text{travel} + 5.84}$ | 16.57 + (0.70 x travel) |

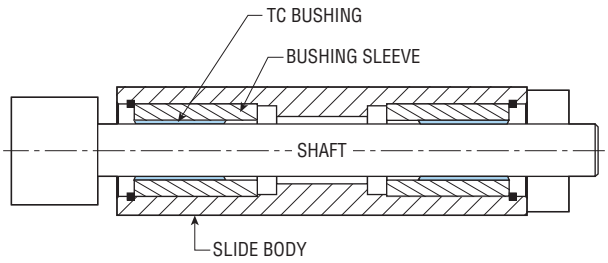
**SE MAXIMUM LOADS & UNIT WEIGHTS**

| UNIT SIZE | SLIDE MODEL | MAX. STATIC SIDE LOAD (lb) | UNIT WEIGHT (lb) |
|---|---|---|---|
| 22 | SED | $\frac{656}{\text{travel} + 5.19}$ | 2.55 + (0.15 x travel) |
| 22 | SEB | $\frac{140}{\text{travel} + 4.47}$ | 2.38 + (0.10 x travel) |
| 22 | SEC | $\frac{377}{\text{travel} + 5.19}$ | 2.38 + (0.10 x travel) |
| 23 | SED | $\frac{1,400}{\text{travel} + 5.4}$ | 4.78 + (0.25 x travel) |
| 23 | SEB | $\frac{350}{\text{travel} + 5.19}$ | 4.64 + (0.18 x travel) |
| 23 | SEC | $\frac{906}{\text{travel} + 5.14}$ | 4.64 + (0.18 x travel) |
| 24 | SED | $\frac{2,000}{\text{travel} + 5.57}$ | 6.45 + (0.35 x travel) |
| 24 | SEB | $\frac{1,670}{\text{travel} + 5.39}$ | 6.36 + (0.28 x travel) |
| 24 | SEC | $\frac{1,670}{\text{travel} + 5.57}$ | 6.36 + (0.28 x travel) |
| 25 | SED | $\frac{5,000}{\text{travel} + 6.53}$ | 12.31 + (0.62 x travel) |
| 25 | SEB | $\frac{2,964}{\text{travel} + 6.35}$ | 11.70 + (0.42 x travel) |
| 25 | SEC | $\frac{2,964}{\text{travel} + 6.53}$ | 11.70 + (0.42 x travel) |
| 26 | SED | $\frac{12,000}{\text{travel} + 8.84}$ | 25.83 + (1.07 x travel) |
| 26 | SEB | $\frac{7,267}{\text{travel} + 8.56}$ | 23.66 + (0.70 x travel) |
| 26 | SEC | $\frac{7,267}{\text{travel} + 8.84}$ | 23.66 + (0.70 x travel) |

## PHD'S TC BUSHING

PHD offers the unique ***TC*** bushings as an alternative to traditional linear ball bushings. The ***TC*** bushings offer the following advantages.

- ***TC*** bushings are maintenance free and self lubricating.
- The thin bushing design permits oversize shafts to be used in the slide body, saving space and decreasing shaft deflection.
- Made to carry static loads up to 5 times greater than traditional linear bushings.
- Can be used in harsh environments where dirt, grit, metal fines, and metal cutting liquids destroy other bushings.
- ***TC*** bushings are nearly impervious to static shock loads because there are no ball bushings to damage or to brinell the shafts.
- End-of-travel shaft vibration is minimal compared to ball bushings (see graph below).
- Slides with PHD's ***TC*** bushings cost less than units with traditional ball bushings.




## LUBRICATION

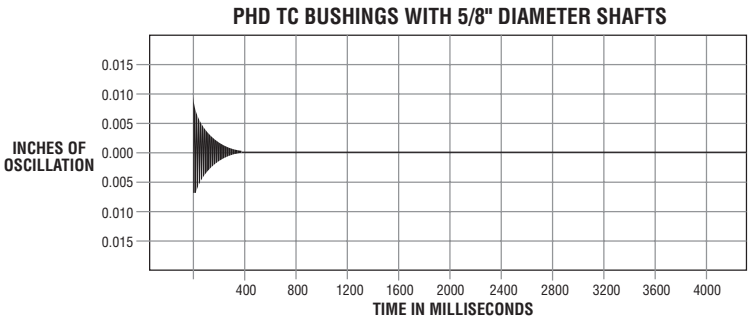
All slides are permanently lubricated at the factory for service under normal conditions. PHD Cylinders can be run using unlubricated air. Use of lubricated air with the cylinders will extend life. Optimum life can be obtained on Series SD/SE Slides by periodic lubrication (every 25 million inches of travel) of the shafts. PHD suggests a lightweight oil. Silicon-based lubricants should **NOT** be used on units with PHD's ***TC*** bushings.

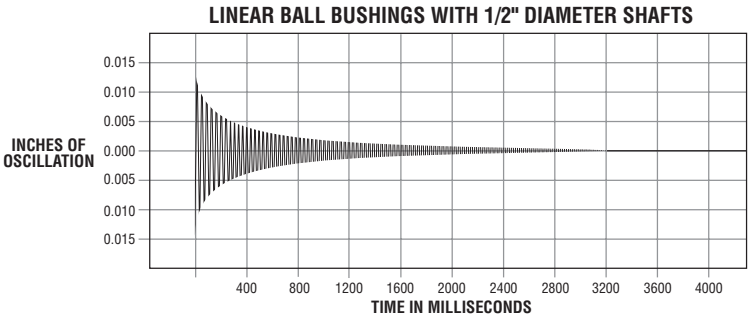
## TOOL PLATE VIBRATION

Tool plate vibration occurs on all slides when the tool plate reaches full extension and the sudden stop causes the slide's shafts to oscillate. This vibration is measured by the distance the tool plate oscillates and the duration or length of time before the vibration stops. This vibration may be critical in applications where precise tool plate location and fast cycle times are required.

Tests have shown that PHD ***TC*** bushings with oversize shafts dampen out this vibration in 1/3 to 1/2 the time with 1/3 less overall tool plate movement. The graphs below show an actual comparison for a PHD size 23 slide between the ***TC*** bushings with oversize shafts and linear ball bushings.

The test was run with a 6" travel slide in a vertical application with a 5 pound off-center load. The unit was cycled at 170 milliseconds using stop collars with no cushions.



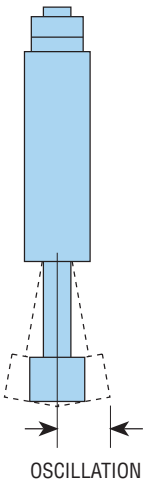

## FRICTION

In horizontal applications, a ***TC*** bushing has a higher breakaway pressure required than a linear bushing. Breakaway pressure is affected by several factors including the load at the tool plate, travel and total moving load. The following formulas yield approximate breakaway pressure for the SD/SE slides.

**20 + ((T x LTP / A) + LTM) B = Breakaway Pressure (psi)**

T = Total travel + tool plate extension (in)
LTM = Total moving load (lb)
LTP = Load at tool plate (lb)

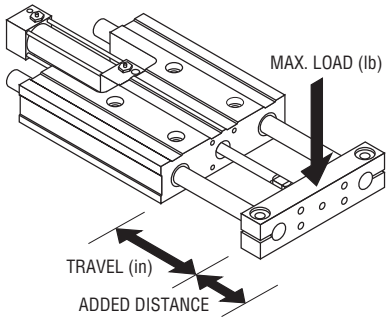
| MODEL | A | B |
|---|---|---|
| SDC22 & SDD22 | 1.56 | 0.814 |
| SEC22 & SED22 | 3.31 | 0.814 |
| SDC23 & SDD23 | 1.96 | 0.423 |
| SEC23 & SED23 | 3.85 | 0.423 |
| SDC24 & SDD24 | 2.47 | 0.317 |
| SEC24 & SED24 | 4.10 | 0.317 |
| SDC25 & SDD25 | 2.73 | 0.202 |
| SEC25 & SED25 | 4.85 | 0.202 |
| SDC26 & SDD26 | 4.08 | 0.085 |
| SEC26 & SED26 | 7.08 | 0.085 |



## MAXIMUM ROLLING LOAD & DEFLECTION GRAPHS

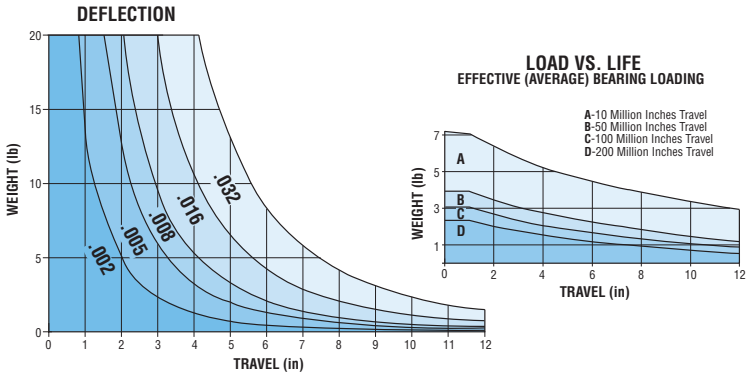
The following graphs are designed to provide a quick and easy method of sizing and comparing each SD and SE Slide. Use the Load Graphs to determine maximum loads based on acceptable life. The linear ball bushing load ratings shown are derated by a factor of 1.2 from the bearing manufacturer's ratings to provide a design safety factor. Use the Deflection Graphs to determine shaft deflection at the desired loads. Consult PHD for applications which exceed maximum load ranges shown.

The deflection figures given in these graphs are based on the effect of external loads. Shaft straightness, shaft weight, and bearing alignment will affect the accuracy of the tool plate location. Consult PHD for applications for high precision tool plate location.

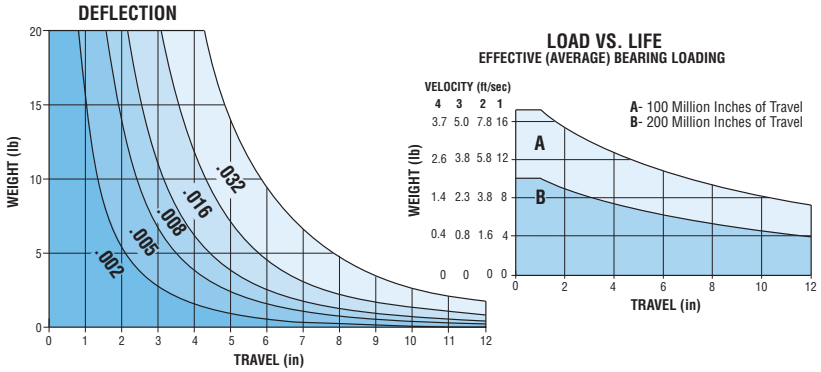



**NOTE:** When the load is out in front of the tool plate, add the distance it is out from the tool plate to the travel length and use the total as the travel length in the following graphs.

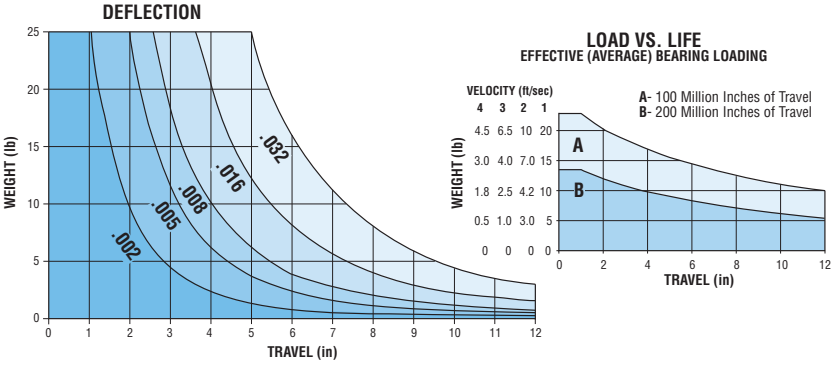
### SDB22 WITH 3/8" SHAFTS AND LINEAR BALL BUSHINGS




### SDC22 WITH 3/8" SHAFTS AND TC BUSHINGS

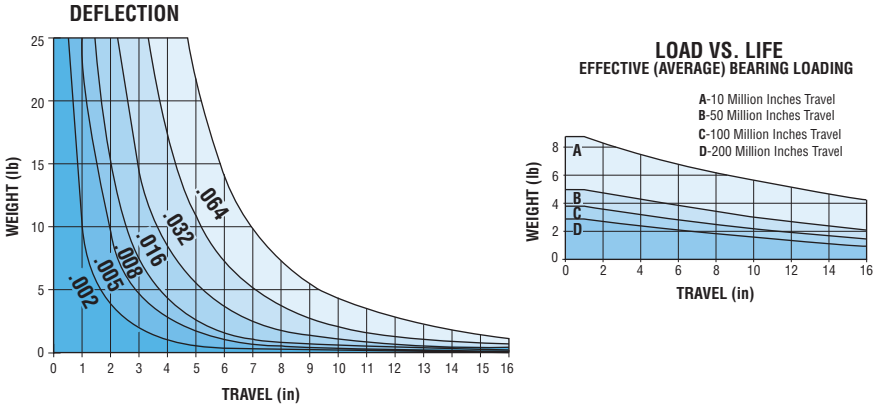



### SDD22 WITH 1/2" SHAFTS AND TC BUSHINGS

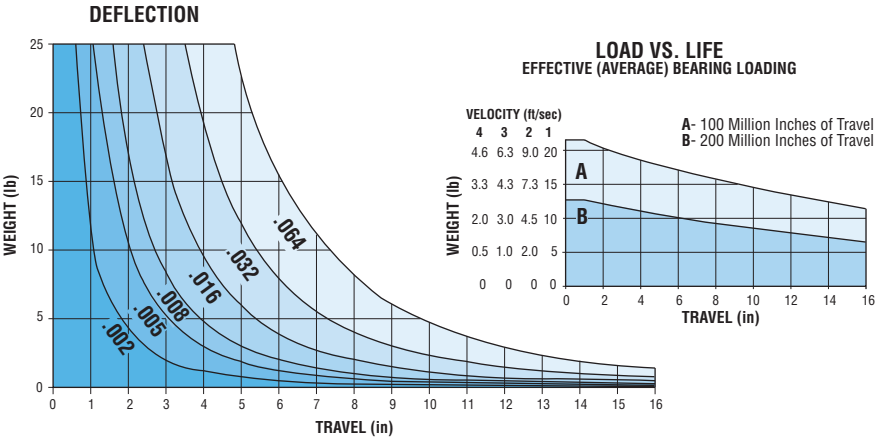


## MAXIMUM ROLLING LOAD & DEFLECTION GRAPHS

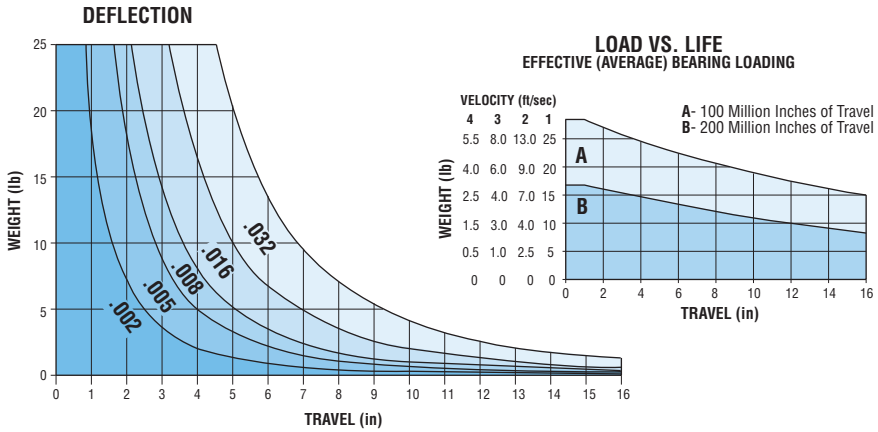
### SEB22 WITH 3/8" SHAFTS AND LINEAR BALL BUSHINGS




### SEC22 WITH 3/8" SHAFTS AND TC BUSHINGS

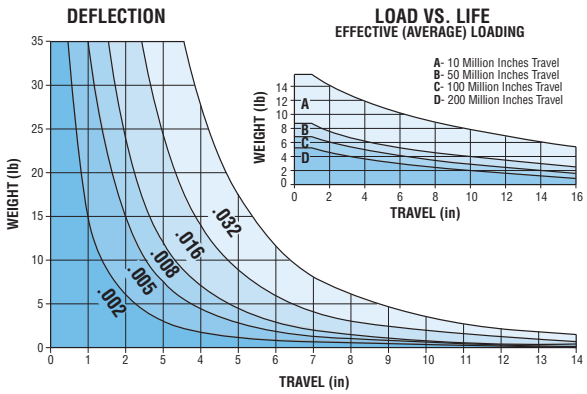



### SED22 WITH 1/2" SHAFTS AND TC BUSHINGS

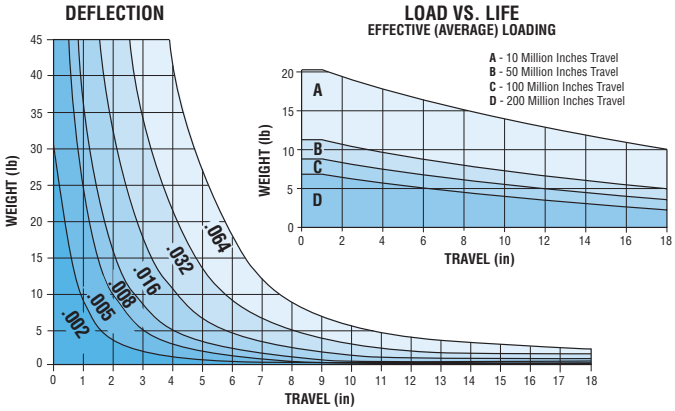


## MAXIMUM ROLLING LOAD & DEFLECTION GRAPHS

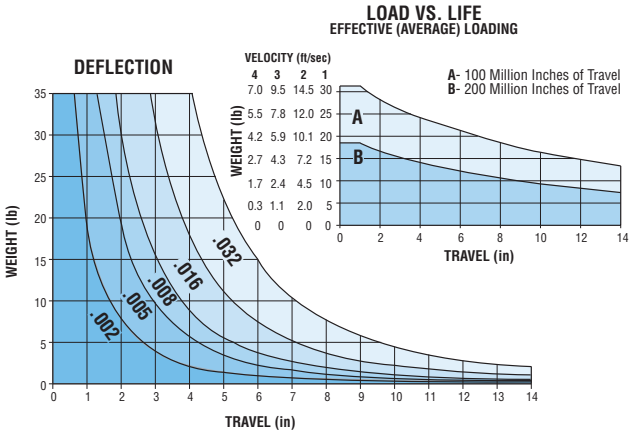
### SDB23 WITH 1/2" SHAFTS AND LINEAR BALL BUSHINGS



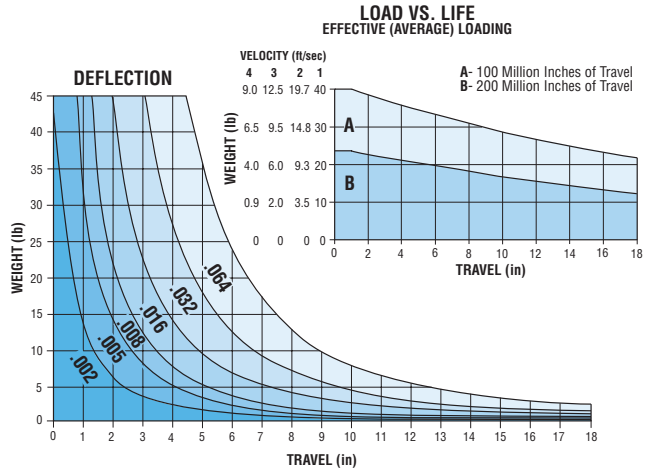

### SEB23 WITH 1/2" SHAFTS AND LINEAR BALL BUSHINGS



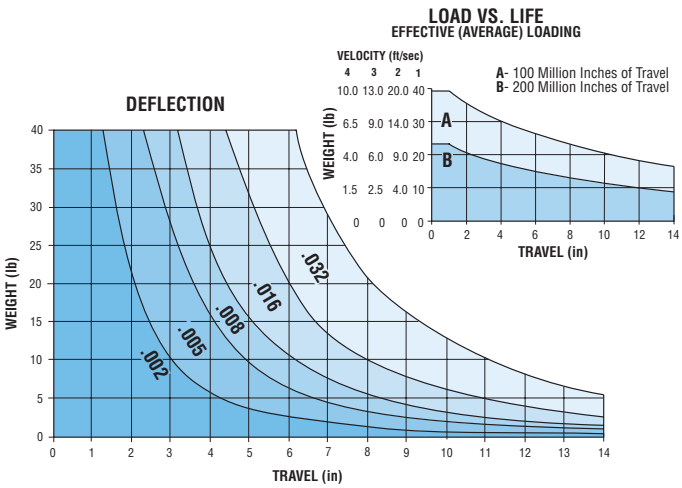

### SDC23 WITH 1/2" SHAFTS AND TC BUSHINGS



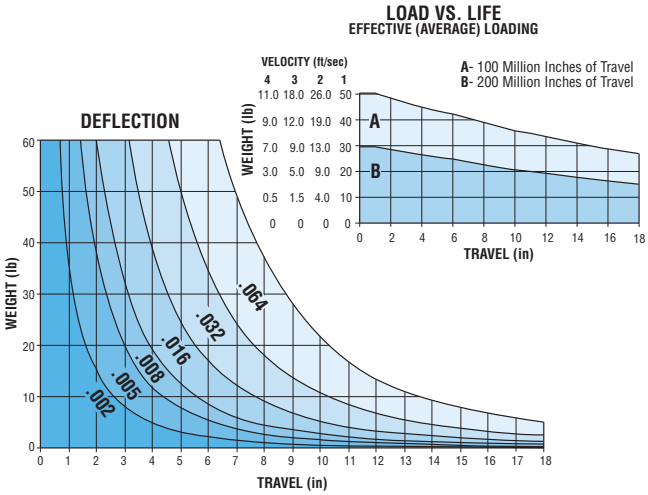

### SEC23 WITH 1/2" SHAFTS AND TC BUSHINGS




### SDD23 WITH 5/8" SHAFTS AND TC BUSHINGS

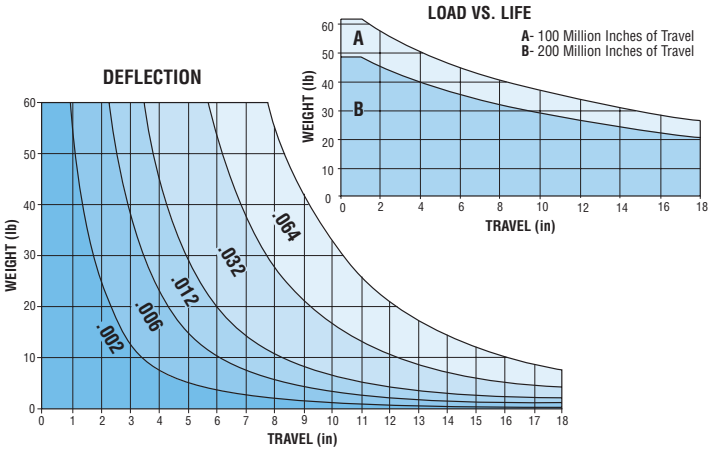



### SED23 WITH 5/8" SHAFTS AND TC BUSHINGS

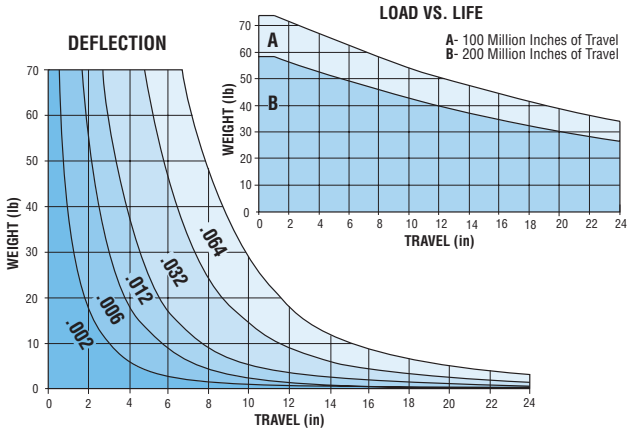


## MAXIMUM ROLLING LOAD & DEFLECTION GRAPHS

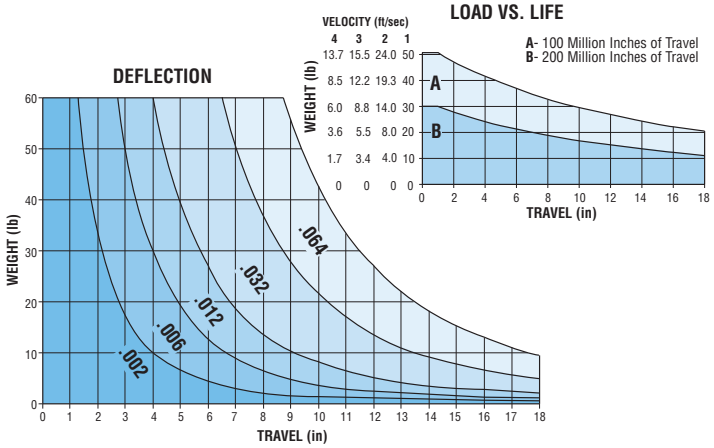
### SDB24 WITH 5/8" SHAFTS AND LINEAR BALL BUSHINGS



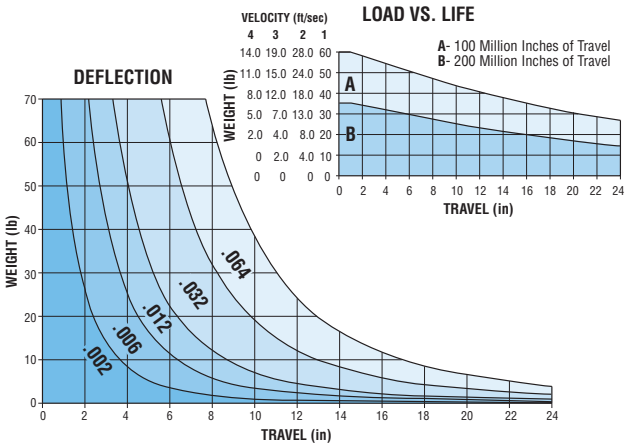

### SEB24 WITH 5/8" SHAFTS AND LINEAR BALL BUSHINGS



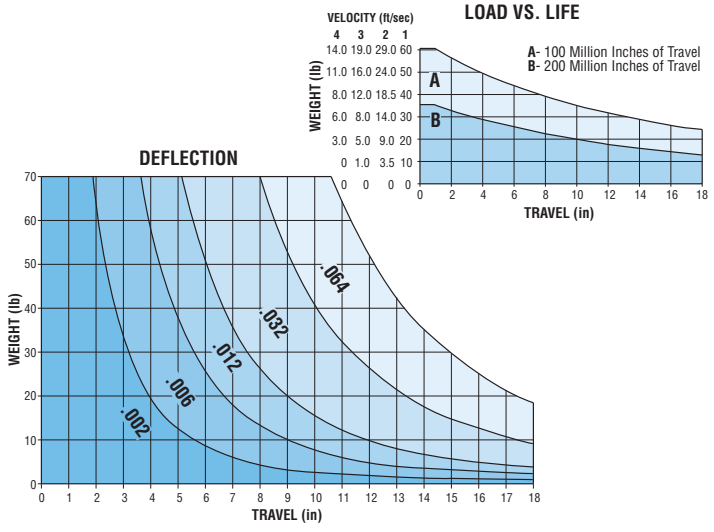

### SDC24 WITH 5/8" SHAFTS AND TC BUSHINGS



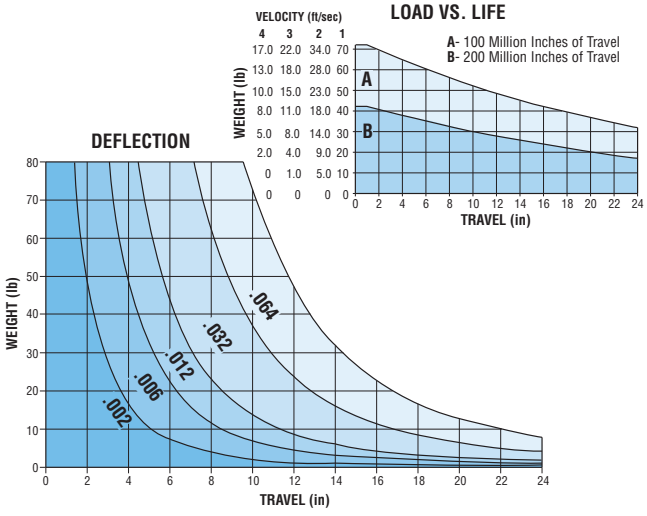

### SEC24 WITH 5/8" SHAFTS AND TC BUSHINGS




### SDD24 WITH 3/4" SHAFTS AND TC BUSHINGS




### SED24 WITH 3/4" SHAFTS AND TC BUSHINGS



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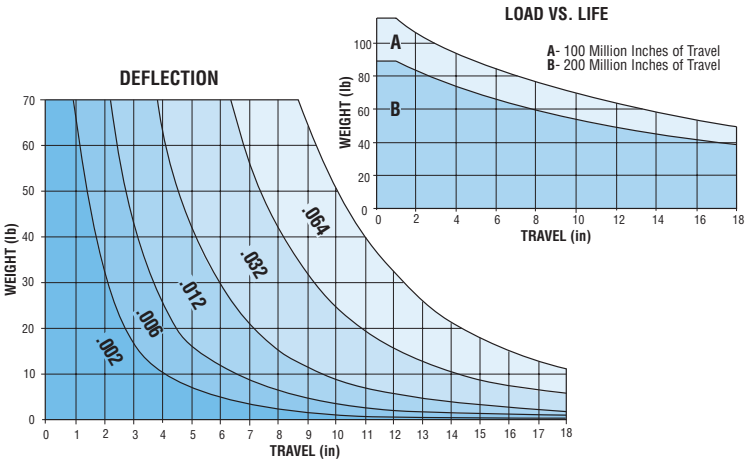
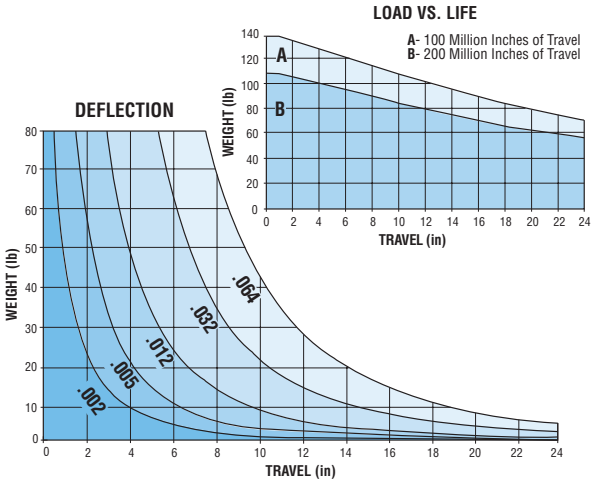
## MAXIMUM ROLLING LOAD & DEFLECTION GRAPHS

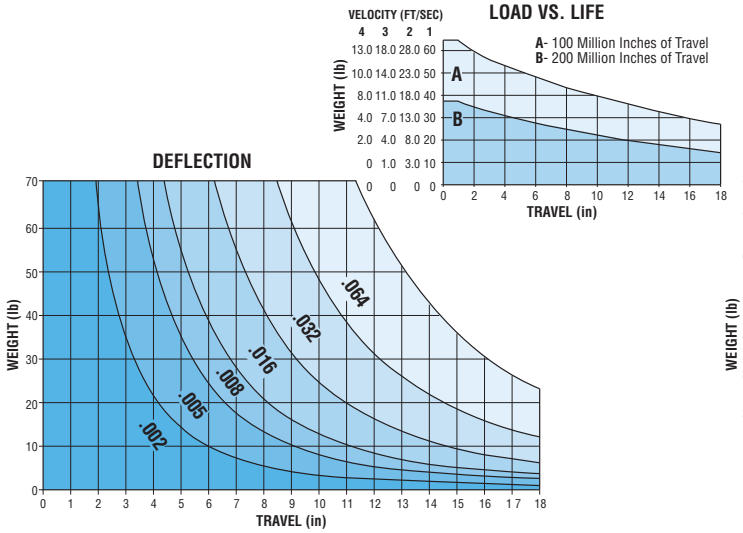
### SDB25 WITH 3/4" SHAFTS AND LINEAR BALL BUSHINGS



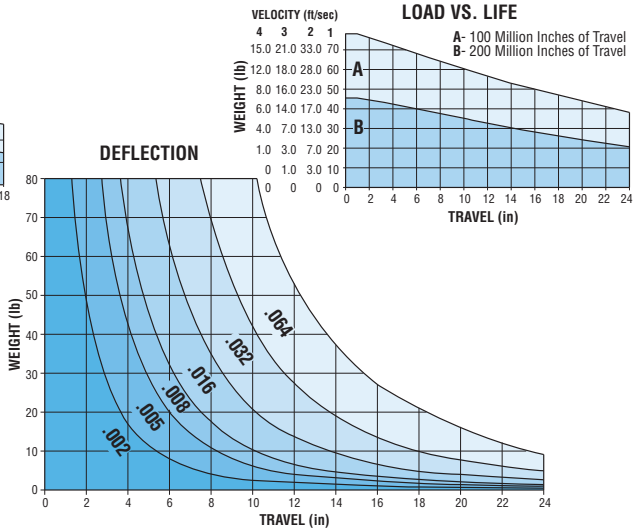

### SEB25 WITH 3/4" SHAFTS AND LINEAR BALL BUSHINGS



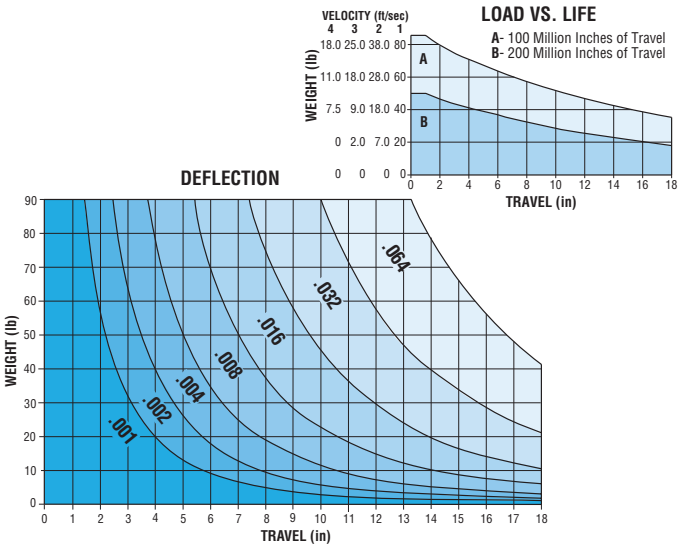

### SDC25 WITH 3/4" SHAFTS AND TC BUSHINGS



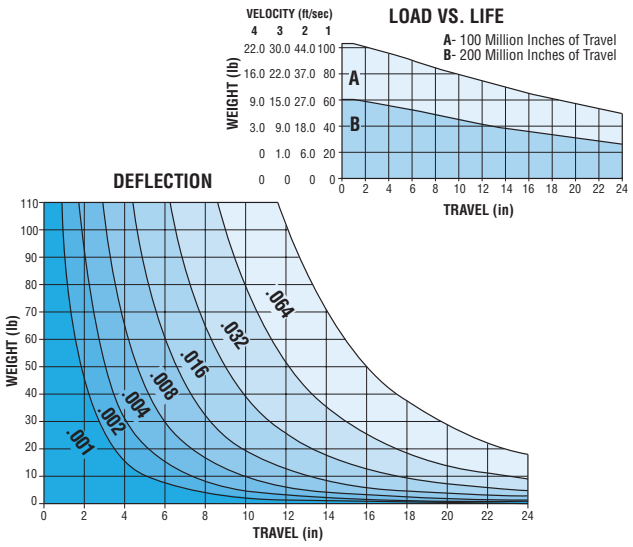

### SEC25 WITH 3/4" SHAFTS AND TC BUSHINGS




### SDD25 WITH 1" SHAFTS AND TC BUSHINGS

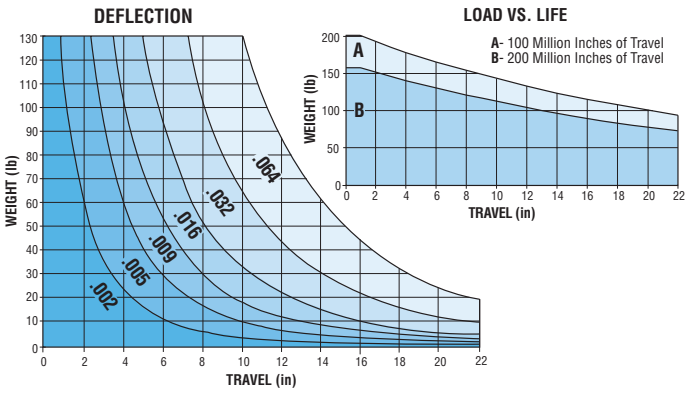



### SED25 WITH 1" SHAFTS AND TC BUSHINGS

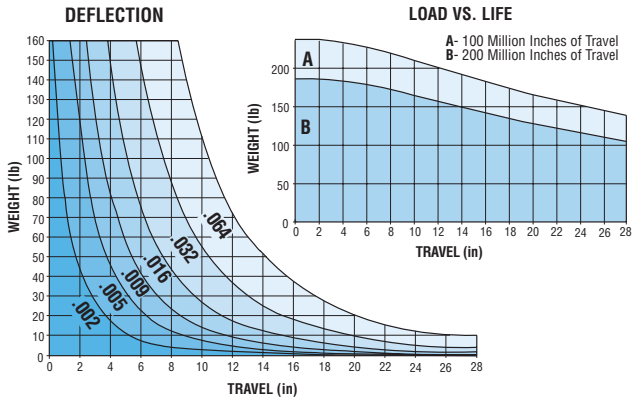


## MAXIMUM ROLLING LOAD & DEFLECTION GRAPHS

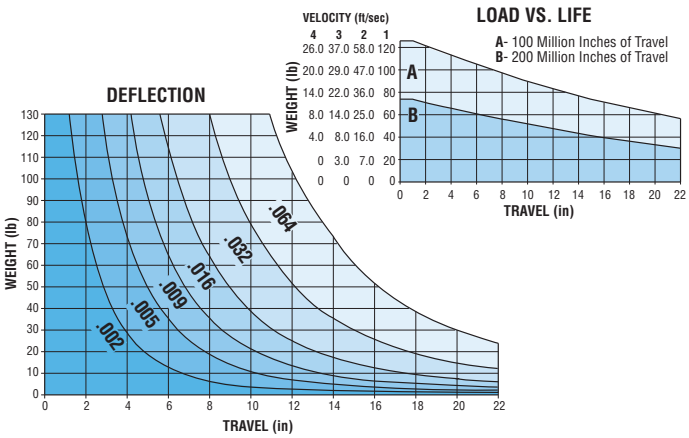
### SDB26 WITH 1" SHAFTS AND LINEAR BALL BUSHINGS



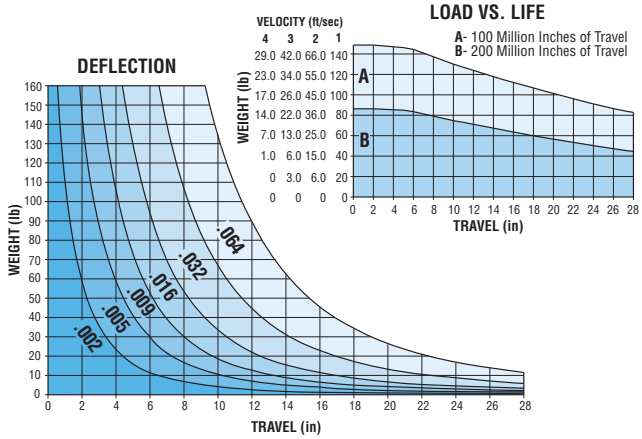

### SEB26 WITH 1" SHAFTS AND LINEAR BALL BUSHINGS



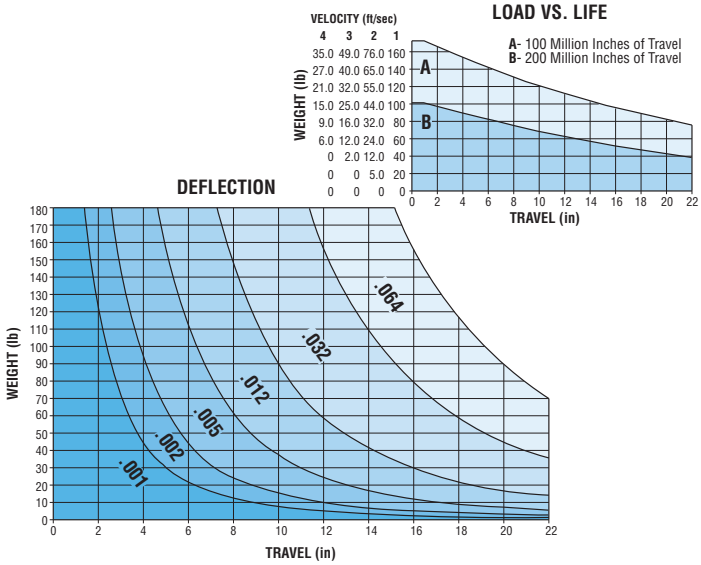

### SDC26 WITH 1" SHAFTS AND TC BUSHINGS



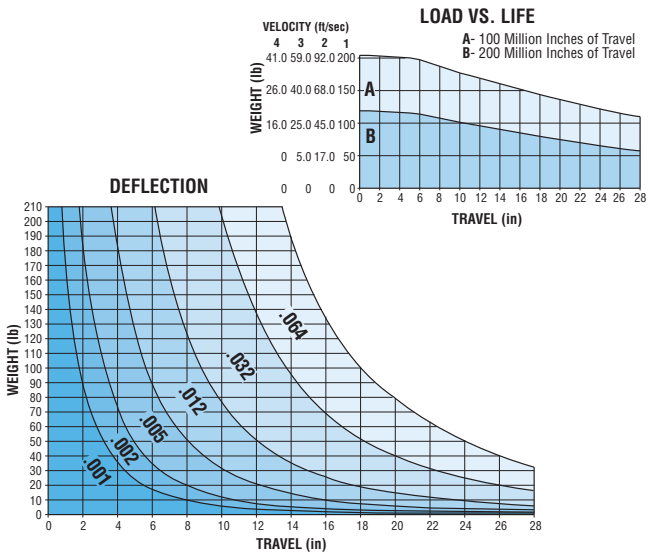

### SEC26 WITH 1" SHAFTS AND TC BUSHINGS




### SDD26 WITH 1 3/8" SHAFTS AND TC BUSHINGS




### SED26 WITH 1 3/8" SHAFTS AND TC BUSHINGS



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## SHOCK ABSORBER SELECTION GUIDE

To determine stopping capacity, calculate total moving weight. From Table 1, determine shaft and tool plate weight ($W_M$). Multiply the travel by the travel adder + base weight.

**Example for SxD22 x 4:**
$W_M$ = (4 x 0.11) + 1.40 = 1.84 lb
Add $W_M$ to attached load (payload) = Total Moving Weight ($W_{TM}$)
1.84 + 3.0 = 4.84 lb

Using Kinetic Energy Graphs below, plot the total moving weight and impact velocity. If the value is less than slide with cylinder, cushion, or travel adjustment curves, that type of deceleration is adequate. If it is greater than these curves, hydraulic shock absorbers are required.

To determine the correct hydraulic shock, complete the calculation on the next page.

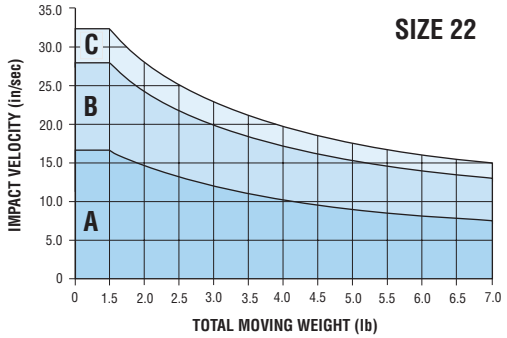
PHD suggests hydraulic shock absorbers for all applications where the center of gravity of the payload is off the slide centerline by more than 2 inches and travelling at speeds greater than 10 in/sec.

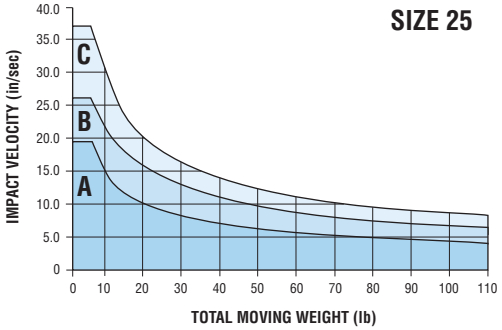
**TABLE 1**

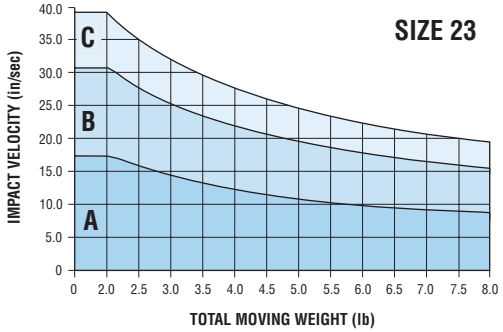
| SLIDE MODEL | BASE WT. lb | TRAVEL ADDER lb/in | CYL. BORE in |
|---|---|---|---|
| SxB22 & SxC22 | 0.95 | 0.06 | |
| SxD22 | 1.40 | 0.11 | 0.750 |
| SxB23 & SxC23 | 1.94 | 0.11 | |
| SxD23 | 2.50 | 0.18 | 1.000 |
| SxB24 & SxC24 | 3.00 | 0.18 | |
| SxD24 | 3.60 | 0.25 | 1.125 |
| SxB25 & SxC25 | 4.90 | 0.25 | |
| SxD25 | 6.70 | 0.45 | 1.375 |
| SxB26 & SxC26 | 9.70 | 0.45 | |
| SxD26 | 14.60 | 0.85 | 2.000 |

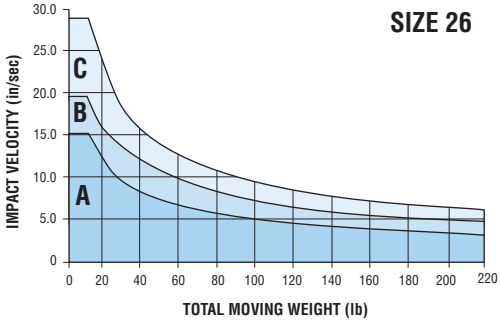
Moving weight adders for slide kinetic energy calculation include tool plate, two shafts, four collars, and P & R.

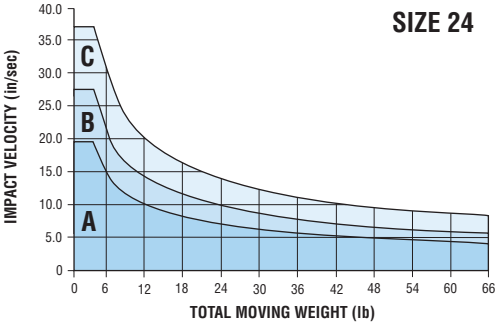
## MAXIMUM ALLOWABLE KINETIC ENERGY GRAPHS




**A** = Slide with cylinder
**B** = Slide with travel adjustments
**C** = Slide with cylinder with cushions

## SHOCK ABSORBER SELECTION GUIDE

### SHOCK ABSORBER SPECIFICATIONS CHART

| SLIDE SIZE | PHD SHOCK ABSORBER NO. | STROKE in | THREAD TYPE | $E_T$ TOTAL ENERGY PER CYCLE in-lb | $E_TC$ TOTAL ENERGY PER HOUR in-lb/hr | SHOCK ABSORBER WEIGHT lb |
|---|---|---|---|---|---|---|
| 22 | 57057-02-x | 0.75 | 3/4-16 UNF | 40 | 400,000 | 0.25 |
| 23 | 57057-02-x | 0.75 | 3/4-16 UNF | 80 | 400,000 | 0.25 |
| 24 | 57057-03-x | 1.00 | 1-12 UNF | 140 | 600,000 | 0.67 |
| 25 | 57057-03-x | 1.00 | 1-12 UNF | 220 | 600,000 | 0.67 |
| 26 | 57057-03-x | 1.00 | 1-12 UNF | 415 | 600,000 | 0.67 |

| MODEL | SIZE | KIT NO. |
|---|---|---|
| SD/SE | 22, 23 | 54108-11 |
| | 24, 25 | 54109-11 |
| | 26 | 54110-11 |

Kit contains all components for standard non-Z1 units for one direction only.

## SHOCK ABSORBER SIZING CALCULATION:

Follow the next six steps to size shock absorbers.

**STEP 1: Identify the following parameters.** These must be known for all energy absorption calculations. Variations or additional information may be required in some cases.

A. The total moving weight to be stopped in lb ($W_{TM}$)
B. The slide velocity (V) at impact with the shock absorber in in/sec
C. External propelling force ($F_D$) in lb
D. Number of cycles per hour
E. Orientation of the application's motion (i.e. horizontal or vertical application). See next page.

**STEP 2: Calculate the kinetic energy of the total moving weight.**
$E_K = (1/2) \times (W_{TM} / 386) \times V^2$

**STEP 3: Calculate the propelling force ($F_D$).**

Horizontal application: $F_D = 0.7854 \times d^2 \times P$
Vertical application: $F_D = (0.7854 \times d^2 \times P) + W_{TM}$

Calculate the work energy input ($E_W$) from any external (propelling) forces acting on the load, using the stroke of the shock absorber selected. $E_W = F_D \times S$

**STEP 4: Calculate the total energy.** $E_T = E_K + E_W$

Use Shock Absorber Specifications Chart to verify that the selected unit has an $E_T$ capacity greater then the value just calculated. If not, reduce velocity, pressure, moving weight, or select a larger slide.

**STEP 5: Calculate the total energy that must be absorbed per hour ($E_TC$).** $E_TC = E_T \times C$

Use Shock Absorber Specifications Chart to verify that the selected unit has an $E_TC$ capacity greater then the value just calculated. If not, reduce the cycles per hour or select a larger slide.

**STEP 6: Determine the damping constant for the selected shock absorber.** Using the appropriate Shock Absorber Performance Graph, locate the intersection point for impact velocity (V) and total energy ($E_T$). The shaded area (-1, -2, or -3) that the point falls in is the correct damping constant for the application.

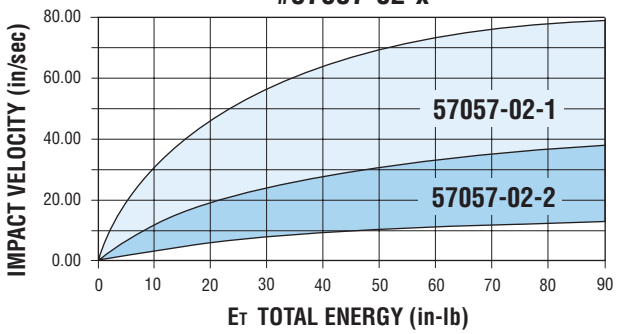
**NOTES:** The total energy per cycle ($E_T$) is based on the slide and its components. Applications with $E_T$ larger than listed are not recommended. Consult PHD for shocks used at cycle rates greater than: 3000/hour on the size 25 slide, 1800/hour on the size 26 slide.

## SYMBOLS DEFINITIONS

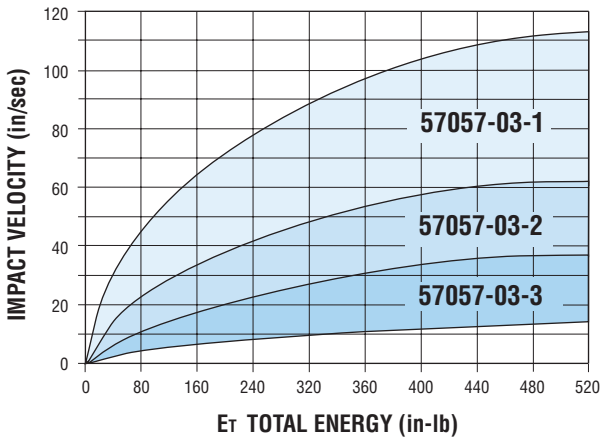
C = Number of cycles per hour
d = Cylinder bore diameter (in)
$E_K$ = Kinetic energy (in-lb)
$E_T$ = Total energy per cycle, $E_K + E_W$ (in-lb)
$E_TC$ = Total energy per hour (in-lb/hr)
$E_W$ = Work or drive energy (in-lb)
$F_D$ = Propelling force (lb)
P = Operating pressure (psi)
S = Stroke of shock absorber (in)
V = Impact velocity (in/sec)
$W_{TM}$ = Total moving weight (lb)

## PHD SHOCK ABSORBER PERFORMANCE GRAPHS

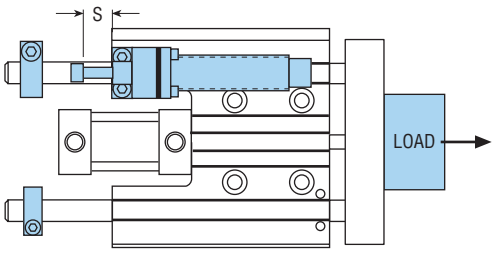
#57057-02-x

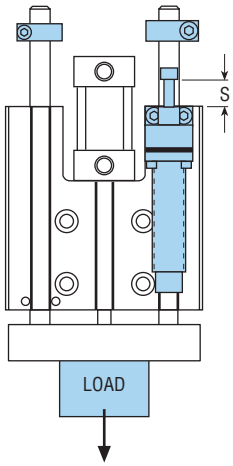



#57057-03-x



## SHOCK ABSORBER SELECTION GUIDE SIZING EXAMPLES




### HORIZONTAL APPLICATION

**STEP 1: Application Data**
Example: SxB24 x 4 in travel and 4.0 lb payload
($W_{TM}$) Weight = 7.72 lb (Total Moving Weight)
(V) Velocity = 40 in/sec (Speed of Travel)
(d) Cylinder Bore Diameter = 1.125 mm
(P) Operating Pressure = 80 psi
(C) Cycles/Hr = 200 c/hr
$W_M$ = 3.00 + (0.18 x 4 in)
$W_M$ = 3.72 lb
$W_{TM}$ = 3.72 + 4.00
$W_{TM}$ = 7.72

**STEP 2: Calculate kinetic energy.**
$E_K = (1 / 2) \times (W_{TM} / 386) \times V^2$
$E_K = 0.5 \times (7.72 / 386) \times 40^2$
$E_K$ = 16 in-lb

**STEP 3: Calculate work energy.**
$F_D = 0.7854 \times d^2 \times P$
$F_D = 0.7854 \times (1.1252) \times 80$
$F_D$ = 79.52 lb
$E_W = F_D \times S$
$E_W$ = 79.52 lb x 1
$E_W$ = 79.5 in-lb

**STEP 4: Calculate total energy.**
$E_T = E_K + E_W$
$E_T$ = 16 + 79.5
$E_T$ = 95.5 in-lb
Since 95.5 is less than $E_T$ in Shock Absorber Specifications Chart, proceed.

**STEP 5: Total energy absorbed per hour**
$E_TC = E_T \times C$
$E_TC$ = 95.5 x 200
$E_TC$ = 19100 in-lb/hr
Since 19100 is less than $E_TC$ in Shock Absorber Specifications Chart, proceed.

**STEP 6: Choose proper damping constant for correct shock absorber on Shock Absorber Performance Graphs (see previous page).** #57057-03-1 is the correct unit for the application.

### VERTICAL APPLICATION

**STEP 1: Application Data**
Example: SxB24 x 6 in travel with a 8 lb payload
($W_{TM}$) Weight = 12.0 lb (Total Moving Weight)
(V) Velocity = 20 in/sec (Speed of Travel)
(d) Cylinder Bore Diameter = 1.125 in
(P) Operating Pressure = 80 psi
(C) Cycles/Hour = 400 c/hr

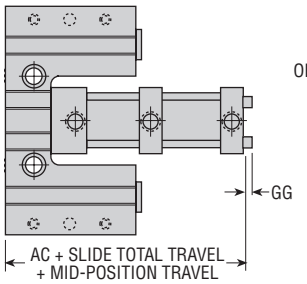
**STEP 2: Calculate kinetic energy.**
$E_K = (1 / 2) \times (W_{TM} / 386) \times V^2$
$E_K = 0.5 \times (7.72 / 386) \times 20^2$
$E_K$ = 6.2 in-lb

**STEP 3: Calculate work energy.**
$F_D = (0.7854 \times d^2 \times P) + W_{TM}$
$F_D$ = 79.5 + 12.0
$F_D$ = 91.5 lb
$E_W = F_D \times S$
$E_W$ = 91.5 x 1
$E_W$ = 91.5 in-lb

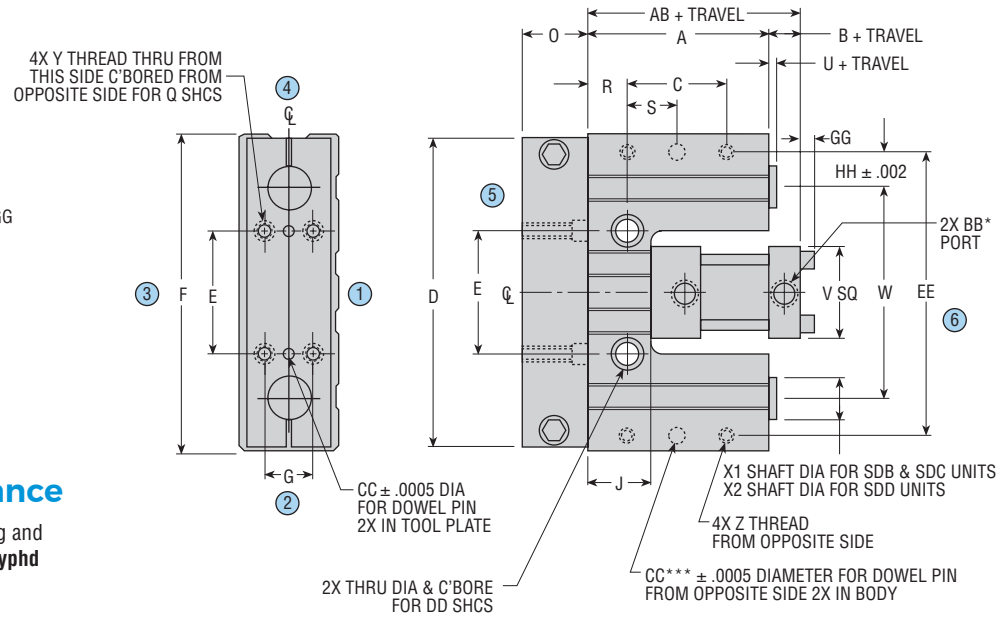
**STEP 4: Calculate total energy.**
$E_T = E_K + E_W$
$E_T$ = 6.2 + 91.5
$E_T$ = 97.7 in-lb
Since 97.7 is less than $E_T$ in Shock Absorber Specifications Chart, proceed.

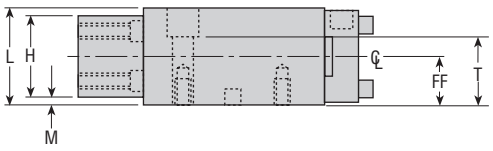
**STEP 5: Total energy absorbed per hour**
$E_TC = E_T \times C$
$E_TC$ = 97.7 x 400
$E_TC$ = 39080 in-lb/hr
Since 39080 is less than $E_TC$ in Shock Absorber Specifications Chart, proceed.

**STEP 6: Choose proper damping constant for correct shock absorber on Shock Absorber Performance graphs (see previous page).** #57057-03-2 is the correct unit for this application.




3 POSITION DETAIL




## CAD & Sizing Assistance

Use PHD's free online Product Sizing and CAD Configurator at **phdinc.com/myphd**

### OPTIONAL CC DOWEL PIN HOLES

| SLIDE MODEL | OPTION J1/*** CLOSE FIT | OPTION J2/J6 NORMAL FIT |
|---|---|---|
| Sxx22 | 0.1884 x 0.250 DP | 0.1913 x 0.250 DP |
| Sxx23 | 0.2509 x 0.312 DP | 0.2520 x 0.312 DP |
| Sxx24 | 0.2509 x 0.312 DP | 0.2520 x 0.312 DP |
| Sxx25 | 0.3759 x 0.470 DP | 0.3770 x 0.470 DP |
| Sxx26 | 0.3759 x 0.500 DP | 0.3770 x 0.500 DP |

### 3 POSITION TRAVEL OPTION

| SLIDE MODEL | AC | *FOR EACH CUSHION | *PORT CONTROL® PB |
|---|---|---|---|
| SDxE22 | 5.102 | 0.500 | 0.250 |
| SDxE23 | 5.292 | 0.500 | 0.250 |
| SDxE24 | 5.792 | 0.500 | 0.250 |
| SDxE25 | 6.894 | 0.875 | — |
| SDxE26 | 8.587 | — | — |

### OPTION ADDERS

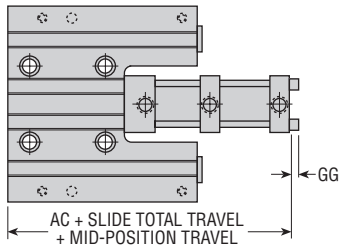
| SIZE | PB | DB | BR/BJ | AR/AT | AE/AS | GG/GN/G22 | GH/GM/G23 | GI/GO/G24 |
|---|---|---|---|---|---|---|---|---|
| 22 | 0.250 | 1.000 | 0.250 | 0.750 | 0.750 | 0.750 | 0.750 | 1.500 |
| 23 | 0.250 | 1.000 | 0.250 | 0.750 | 0.750 | 0.750 | 0.750 | 1.500 |
| 24 | 0.250 | 1.000 | 0.250 | 0.750 | 0.750 | 0.750 | 0.750 | 1.500 |
| 25 | 0.000 | 1.750 | 0.250 | 0.750 | 0.750 | 0.750 | 0.750 | 1.500 |
| 26 | 0.000 | 0.000 | 0.250 | 0.875 | 0.875 | 0.875 | 0.875 | 1.750 |

**NOTES:**

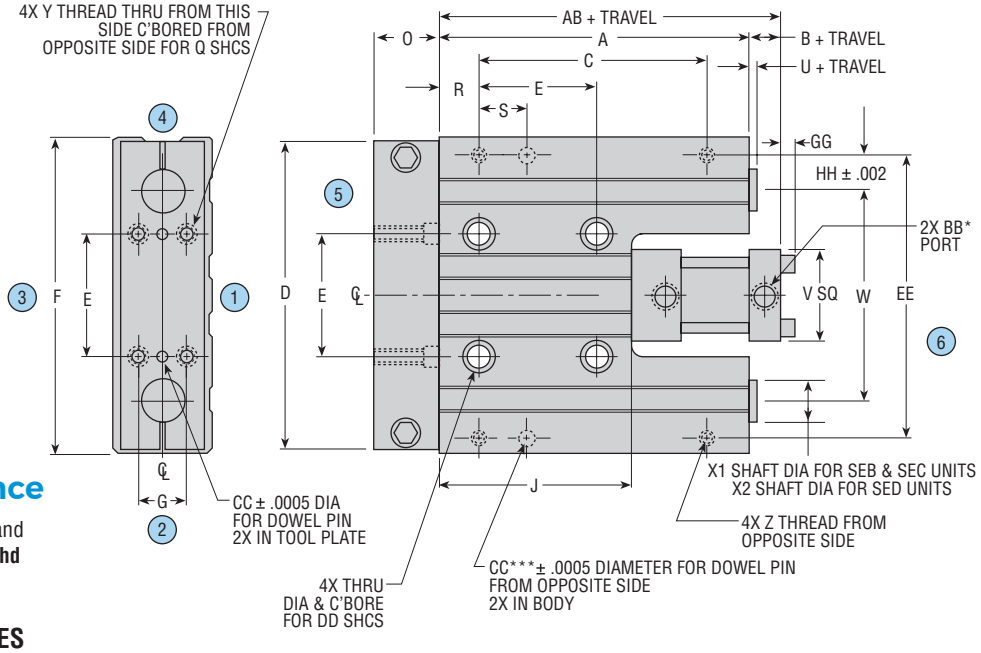
1) FOR OPTIONS PB AND DB, ADD TO CYLINDER'S LENGTH (AFFECTS DIMENSIONS B, AB, AC)
2) FOR OPTIONS BR, BJ, AR, AT, GN, G23 AND GH, ADD BETWEEN DIMENSIONS O AND AC, O AND AB
3) FOR OPTIONS GM, AE, AS, AND GG, G22 ADD TO DIMENSION U
4) FOR OPTIONS GO AND GI, ADD HALF BETWEEN DIMENSIONS O AND AC, O AND AB, AND HALF TO DIMENSION U
5) SEE OPTION PAGES FOR DETAILED OPTION INFORMATION
6) STROKE IS +0.030/-0.000
7) ALL DIMENSIONS ARE CENTERED ON DESIGNATED CENTERLINE OF THE UNIT UNLESS OTHERWISE SPECIFIED
8) PORT LOCATION FOR SDx26 IS NOT ON CENTERLINE
9) *PORT IS #10-32 WITH OPTION -PB ON SIZE 22
10) **TOLERANCE IS ±0.0008 BETWEEN CLOSE FIT DOWEL PIN HOLES. TOLERANCE IS ±0.001 BETWEEN NORMAL FIT DOWEL PIN HOLES
11) ***CLOSE FIT DOWEL PINS ARE STANDARD IN BODY
12) CIRCLED NUMBERS INDICATE POSITION

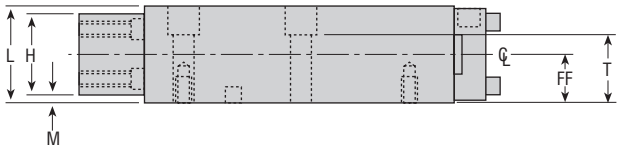
| SIZE | BORE SIZE | LETTER DIMENSION | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E** | F | G | H | J | L | M | O | Q | R | S | T | U |
| 22 | 3/4 | 2.390 | 0.680 | 1.375 | 3.800 | 1.625 | 3.880 | 0.580 | 1.000 | 0.790 | 1.200 | 0.100 | 0.700 | #10 x 0.215 DP | 0.500 | 0.500 | 0.825 | 0.160 |
| 23 | 1 | 2.880 | 0.380 | 1.500 | 4.720 | 1.875 | 4.820 | 0.750 | 1.250 | 0.980 | 1.500 | 0.125 | 0.950 | #10 x 0.215 DP | 0.625 | 0.750 | 1.045 | 0.045 |
| 24 | 1-1/8 | 3.390 | 0.370 | 1.750 | 5.400 | 2.000 | 5.500 | 0.900 | 1.500 | 1.480 | 1.700 | 0.100 | 0.950 | 1/4 x 0.275 DP | 0.750 | 0.875 | 1.260 | 0.035 |
| 25 | 1-3/8 | 3.650 | 0.704 | 1.750 | 6.450 | 2.375 | 6.550 | 1.300 | 2.000 | 1.500 | 2.200 | 0.100 | 1.200 | 5/16 x 0.338 DP | 0.875 | 0.875 | 1.542 | 0.025 |
| 26 | 2 | 5.000 | 0.346 | 3.000 | 8.375 | 3.125 | 8.500 | 1.625 | 2.500 | 1.700 | 2.750 | 0.125 | 1.450 | 3/8 x 0.400 DP | 1.000 | 1.500 | 2.050 | 0.175 |

| SIZE | V | W | X1 | X2 | Y | Z | AB | BB | CC*** | DD | EE** | FF | GG | HH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | 1.000 | 2.625 | 0.375 | 0.500 | 1/4-20 | #10-24 x 0.37 DP | 3.116 | 1/8 NPT* | 0.1884 x 0.25 DP | 1/4 | 3.437 | 0.600 | – | 0.406 |
| 23 | 1.375 | 3.250 | 0.500 | 0.625 | 1/4-20 | 1/4-20 x 0.40 DP | 3.306 | 1/8 NPT | 0.2509 x 0.31 DP | 5/16 | 4.330 | 0.750 | – | 0.540 |
| 24 | 1.500 | 3.625 | 0.625 | 0.750 | 5/16-18 | 1/4-20 x 0.50 DP | 3.806 | 1/8 NPT | 0.2509 x 0.31 DP | 3/8 | 5.000 | 0.850 | – | 0.688 |
| 25 | 1.875 | 4.250 | 0.750 | 1.000 | 3/8-16 | 3/8-16 x 0.69 DP | 4.354 | 1/8 NPT | 0.3759 x 0.47 DP | 3/8 | 5.875 | 1.100 | 0.265 | 0.813 |
| 26 | 2.500 | 5.750 | 1.000 | 1.375 | 1/2-13 | 3/8-16 x 0.75 DP | 5.346 | 1/4 NPT | 0.3759 x 0.50 DP | 1/2 | 7.750 | 1.375 | 0.322 | 1.000 |




3 POSITION DETAIL




## CAD & Sizing Assistance

Use PHD's free online Product Sizing and CAD Configurator at **phdinc.com/myphd**

### OPTIONAL CC DOWEL PIN HOLES

| SLIDE MODEL | OPTION J1/*** CLOSE FIT | OPTION J2/J6 NORMAL FIT |
|---|---|---|
| Sxx22 | 0.1884 x 0.250 DP | 0.1913 x 0.250 DP |
| Sxx23 | 0.2509 x 0.312 DP | 0.2520 x 0.312 DP |
| Sxx24 | 0.2509 x 0.312 DP | 0.2520 x 0.312 DP |
| Sxx25 | 0.3759 x 0.470 DP | 0.3770 x 0.470 DP |
| Sxx26 | 0.3759 x 0.500 DP | 0.3770 x 0.500 DP |

### 3 POSITION TRAVEL OPTION

| SLIDE MODEL | AC | *FOR EACH CUSHION | *PORT CONTROL® PB |
|---|---|---|---|
| SExE22 | 6.852 | 0.500 | 0.250 |
| SExE23 | 7.292 | 0.500 | 0.250 |
| SExE24 | 7.542 | 0.500 | 0.250 |
| SExE25 | 9.144 | 0.875 | — |
| SExE26 | 11.587 | — | — |

### OPTION ADDERS

| SIZE | PB | DB | BR/BJ | AR/AT | AE/AS | GG/GN/G22 | GH/GM/G23 | GI/GO/G24 |
|---|---|---|---|---|---|---|---|---|
| 22 | 0.250 | 1.000 | 0.250 | 0.750 | 0.750 | 0.750 | 0.750 | 1.500 |
| 23 | 0.250 | 1.000 | 0.250 | 0.750 | 0.750 | 0.750 | 0.750 | 1.500 |
| 24 | 0.250 | 1.000 | 0.250 | 0.750 | 0.750 | 0.750 | 0.750 | 1.500 |
| 25 | 0.000 | 1.750 | 0.250 | 0.750 | 0.750 | 0.750 | 0.750 | 1.500 |
| 26 | 0.000 | 0.000 | 0.250 | 0.875 | 0.875 | 0.875 | 0.875 | 1.750 |

**NOTES:**

1) FOR OPTIONS PB AND DB, ADD TO CYLINDER'S LENGTH (AFFECTS DIMENSIONS B, AB, AC)
2) FOR OPTIONS BR, BJ, AR, AT, GN, AND GH, G23 ADD BETWEEN DIMENSIONS O AND AC, O AND AB
3) FOR OPTIONS GM, AE, AS, AND GG, G22 ADD TO DIMENSION U
4) FOR OPTIONS GO AND GI, ADD HALF BETWEEN DIMENSIONS O AND AC, O AND AB, AND HALF TO DIMENSION U
5) SEE OPTION PAGES FOR DETAILED OPTION INFORMATION
6) STROKE IS +0.030/-0.000
7) ALL DIMENSIONS ARE CENTERED ON DESIGNATED CENTERLINE OF THE UNIT UNLESS OTHERWISE SPECIFIED
8) PORT LOCATION FOR SEx26 IS NOT ON CENTERLINE
9) *PORT IS #10-32 WITH OPTION -PB ON SIZE 22
10) **TOLERANCE IS ±0.0008 BETWEEN CLOSE FIT DOWEL PIN HOLES, TOLERANCE IS ±0.001 BETWEEN NORMAL FIT DOWEL PIN HOLES
11) ***CLOSE FIT DOWEL PINS ARE STANDARD IN BODY
12) CIRCLED NUMBERS INDICATE POSITION

| SIZE | BORE SIZE | LETTER DIMENSION | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E** | F | G | H | J | L | M | O | Q | R | S | T | U |
| 22 | 3/4 | 4.140 | 0.680 | 3.125 | 3.800 | 1.625 | 3.880 | 0.580 | 1.000 | 2.540 | 1.200 | 0.100 | 0.700 | #10 x 0.215 DP | 0.500 | 0.500 | 0.825 | 0.160 |
| 23 | 1 | 4.770 | 0.490 | 3.500 | 4.720 | 1.875 | 4.820 | 0.750 | 1.250 | 2.980 | 1.500 | 0.125 | 0.950 | #10 x 0.215 DP | 0.625 | 0.750 | 1.045 | 0.045 |
| 24 | 1-1/8 | 5.020 | 0.490 | 3.500 | 5.400 | 2.000 | 5.500 | 0.900 | 1.500 | 3.230 | 1.700 | 0.100 | 0.950 | 1/4 x 0.275 DP | 0.750 | 0.875 | 1.260 | 0.035 |
| 25 | 1-3/8 | 5.770 | 0.834 | 4.000 | 6.450 | 2.375 | 6.550 | 1.300 | 2.000 | 3.750 | 2.200 | 0.100 | 1.200 | 5/16 x 0.338 DP | 0.875 | 0.875 | 1.542 | 0.025 |
| 26 | 2 | 8.000 | 0.346 | 6.000 | 8.375 | 3.125 | 8.500 | 1.625 | 2.500 | 4.700 | 2.750 | 0.125 | 1.450 | 3/8 x 0.400 DP | 1.000 | 1.500 | 2.050 | 0.175 |

| SIZE | V | W | X1 | X2 | Y | Z | AB | BB | CC*** | DD | EE** | FF | GG | HH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | 1.000 | 2.625 | 0.375 | 0.500 | 1/4-20 | #10-24 x 0.37 DP | 4.866 | 1/8 NPT* | 0.1884 x 0.25 DP | 1/4 | 3.437 | 0.600 | – | 0.406 |
| 23 | 1.375 | 3.250 | 0.500 | 0.625 | 1/4-20 | 1/4-20 x 0.40 DP | 5.306 | 1/8 NPT | 0.2509 x 0.31 DP | 5/16 | 4.330 | 0.750 | – | 0.540 |
| 24 | 1.500 | 3.625 | 0.625 | 0.750 | 5/16-18 | 1/4-20 x 0.50 DP | 5.556 | 1/8 NPT | 0.2509 x 0.31 DP | 3/8 | 5.000 | 0.850 | – | 0.688 |
| 25 | 1.875 | 4.250 | 0.750 | 1.000 | 3/8-16 | 3/8-16 x 0.69 DP | 6.604 | 1/8 NPT | 0.3759 x 0.47 DP | 3/8 | 5.875 | 1.100 | 0.265 | 0.813 |
| 26 | 2.500 | 5.750 | 1.000 | 1.375 | 1/2-13 | 3/8-16 x 0.75 DP | 8.346 | 1/4 NPT | 0.3759 x 0.50 DP | 1/2 | 7.750 | 1.375 | 0.322 | 1.000 |

## PB PORT CONTROL®

The exclusive PHD Port Control®, based on the "meter-out" principle, features an adjustable needle and check seal. Both are built into the cylinder head and cap and are used to control the speed of the slide over its entire travel.

The self-locking needle has micrometer threads and is adjustable under pressure. It determines the orifice size which controls the exhaust volume only of the cylinder proper. The check seal is closed while fluid is exhausting from the cylinder, but opens to permit full flow of incoming fluids. The PHD Port Control® provides the optimum in speed control for slides. All adjustments are made from the top surface of the slide. It saves space and eliminates the cost of installation and fittings for external flow control valves.

**NOTE:** Port Controls add 1/4" to the cylinder length (affects dimensions AB, AC, and B) on sizes 22, 23, and 24.

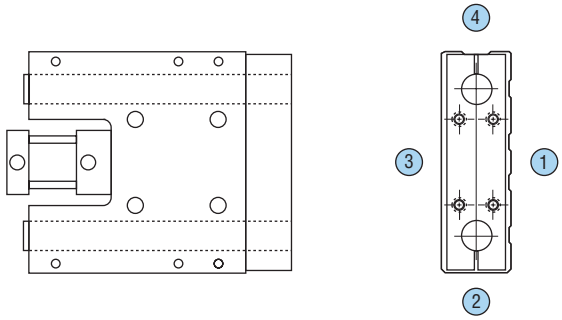
**MAXIMUM SLIDE VELOCITY**
**SD & SE SLIDES**

**50 in/sec without Port Controls®**
**16 in/sec with Port Controls®**

The above figures are based on a working pressure of 100 psi and a no load horizontal condition.

## U7 PORTS AND CONTROL NEEDLE IN POSITION 3

This option provides for the ports, Port Control®, and cushions to be in position 3, or underside of the unit (180° from standard).

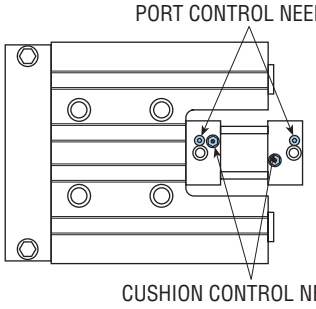



## DB ADJUSTABLE CUSHIONS

PHD Cushions are designed for smooth deceleration at each end of travel. When the cushion is activated, the remaining volume in the cylinder must exhaust past an adjustable needle which controls the amount of deceleration. The wide adjustment range makes the cushion ideal for end of travel shock reduction. Cushion needles are located on the same side as the Port Control® needles for easy access and adjustment.

**NOTE:** Cushions add to the cylinder length (affects dimensions AB, AC, and B) add 1.000" on sizes 22, 23, and 24; and 1.750" on size 25.

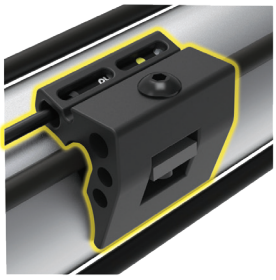
### PORT CONTROL® & CUSHION ADJUSTMENT POSITIONS




Effective cushion length 1/2" on size 22 through 24 and 3/4" on size 25.

## E MAGNETIC PISTON FOR SERIES JC1 RADIAL SENSING SWITCHES

This option equips the cylinder with a magnetic band on the piston for use with PHD Series JC1 radial sensing switches.



## M MAGNETIC PISTON FOR SERIES JC1 REED & TEACHABLE SWITCHES

This option equips the cylinder with a magnetic band on the piston for use with PHD Series JC1 read and teachable switches.

These cylinder-mounted switches are an easy and convenient way of interfacing the slide to various programmable controllers or logic systems. See page 65 for information. **SWITCHES AND BRACKETS MUST BE ORDERED SEPARATELY.**

All dimensions are reference only unless specifically toleranced.

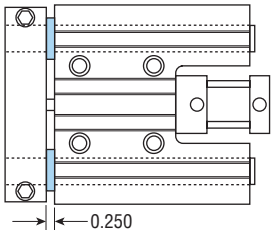
## L10 OVERSIZED PORTS
**(available on sizes 25 & 26 only)**

This option provides an oversized port on the head and cap of the cylinder for size 25 and 26. This will then allow ports to match appropriate sized NFPA cylinder standards.

Size 25 ports become 1/4 NPT instead of 1/8 NPT. Size 26 ports become 3/8 NPT instead of 1/4 NPT. Ports will remain in standard port locations.

## BR SHOCK PADS ON RETRACTION

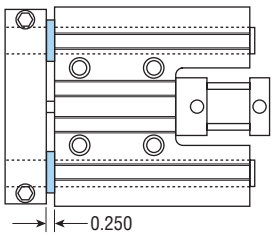
This option provides polyurethane shock pads on retraction only, eliminating metal-to-metal contact as the tool plate reaches the slide body. This option greatly reduces noise and shock upon slide retraction. Not available with tool plate extension.




ADD TO BASIC SLIDE DIMENSIONS

## BJ HushStop SHOCK PADS ON RETRACTION

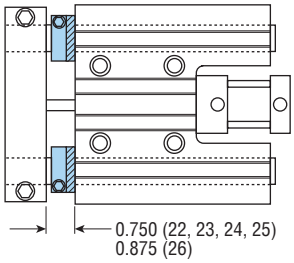
This option provides composite shock pads on retraction only, eliminating metal-to-metal contact as the tool plate reaches the slide body. This option, quieter than the BR option, greatly reduces noise and shock upon slide retraction. Not available with tool plate extension. Due to the composite shock pads, stop locations may vary. For close tolerance stop locations, use BR option.




ADD TO BASIC SLIDE DIMENSIONS

## AR TRAVEL ADJUSTMENT AND SHOCK PADS ON RETRACTION

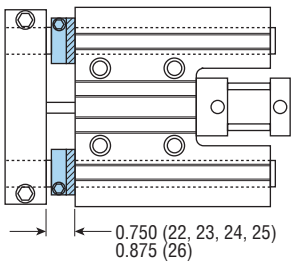
This option provides both travel adjustment stop collars and polyurethane shock pads on retraction only. The travel adjustment stop collars provide infinite adjustment while the shock pads eliminate metal-to-metal contact, thereby quieting the unit.




ADD TO BASIC SLIDE DIMENSIONS

## AT TRAVEL ADJUSTMENT AND HushStop SHOCK PADS ON RETRACTION

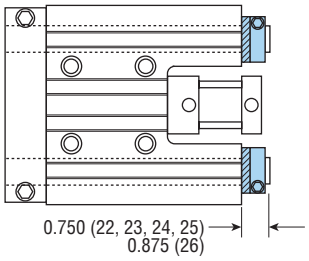
This option, quieter than the AR option, provides both travel adjustment stop collars and composite shock pads on retraction only. The travel adjustment stop collars provide infinite adjustment while the shock pads eliminate metal-to-metal contact, thereby quieting the unit. Due to the composite shock pads, stop locations may vary. For close tolerance stop locations, use the AR option.




ADD TO BASIC SLIDE DIMENSIONS

## AE TRAVEL ADJUSTMENT AND SHOCK PADS ON EXTENSION

This option provides both travel adjustment stop collars and polyurethane shock pads on extension only. The travel adjustment stop collars provide infinite adjustment while the shock pads eliminate metal-to-metal contact, thereby quieting the unit.

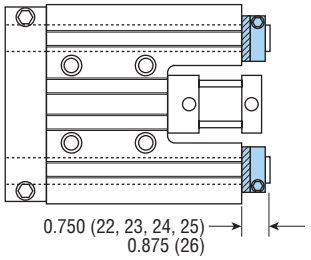



ADD TO BASIC SLIDE DIMENSIONS

All dimensions are reference only unless specifically toleranced.

## AS TRAVEL ADJUSTMENT AND HushStop SHOCK PADS ON EXTENSION

This option, quieter than the AE option, provides both travel adjustment stop collars and composite shock pads on extension only. The travel adjustment stop collars provide infinite adjustment while the shock pads eliminate metal-to-metal contact, thereby quieting the unit. Due to the composite shock pads, stop locations may vary. For close tolerance stop locations, use the AE option.




ADD TO BASIC SLIDE DIMENSIONS

### STOP & TRAVEL ADJUSTMENT KITS

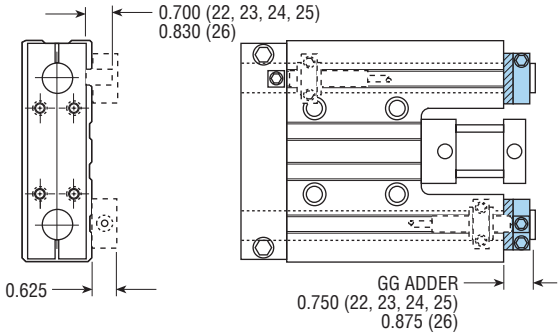
| KIT TYPE | SHAFT | 22 | 23 | 24 | 25 | 26 |
|---|---|---|---|---|---|---|
| STANDARD TRAVEL ADJUSTMENT (-AR OR -AE) | STANDARD | 59737-01 | 59737-03 | 59737-05 | 59737-07 | 59737-09 |
| | OVERSIZED | 59737-02 | 59737-04 | 59737-06 | 59737-08 | 59737-10 |
| HushStop TRAVEL ADJUSTMENT (-AT OR -AS) | STANDARD | 67653-01 | 67653-03 | 67653-05 | 67653-07 | 67653-09 |
| | OVERSIZED | 67653-02 | 67653-04 | 67653-06 | 67653-08 | 67653-10 |
| STANDARD PROXIMITY & TRAVEL ADJUSTMENT (-GG OR -GH) | STANDARD | 59745-01 | 59745-03 | 59745-05 | 59745-07 | 59745-09 |
| | OVERSIZED | 59745-02 | 59745-04 | 59745-06 | 59745-08 | 59745-10 |
| HushStop PROXIMITY & TRAVEL ADJUSTMENT (-G22 OR -G23) | STANDARD | 67651-01 | 67651-03 | 67651-05 | 67651-07 | 67651-09 |
| | OVERSIZED | 67651-02 | 67651-04 | 67651-06 | 67651-08 | 67651-10 |
| SHOCK ABSORBER STOP (-GM OR -GN) | STANDARD | 59746-01 | 59746-03 | 59746-05 | 59746-07 | 59746-09 |
| | OVERSIZED | 59746-02 | 59746-04 | 59746-06 | 59746-08 | 59746-10 |

Kit contains all components for standard non-Z1 units for one direction only.

## GG TRAVEL ADJUSTMENT AND SHOCK PADS ON EXTENSION

**with provisions for proximity switch mounting in both directions**

This option provides both travel adjustment and polyurethane shock pads on extension; with provisions for mounting of proximity switch targets and brackets on both ends. **Switches and bracket kits must be ordered separately.** See page 65 for bracket/target kits and for switch ordering information. Not available with tool plate extension. With tool plate extension use GH option.



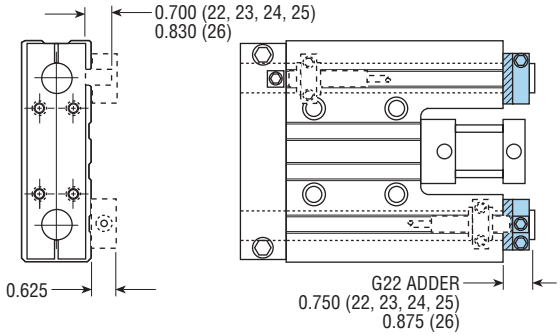

ADD TO BASIC SLIDE DIMENSIONS

## G22 TRAVEL ADJUSTMENT AND HushStop SHOCK PADS ON EXTENSION

**with provisions for proximity switch mounting in both directions**

This option, quieter than the GG option, provides both travel adjustment and composite shock pads on extension; with provisions for mounting of proximity switch targets and brackets on both ends. **Switches and bracket kits must be ordered separately.** See page 65 for bracket/target kits and for switch ordering information.

Due to the composite shock pads, stop locations may vary. For close tolerance stop locations, use the GG option.



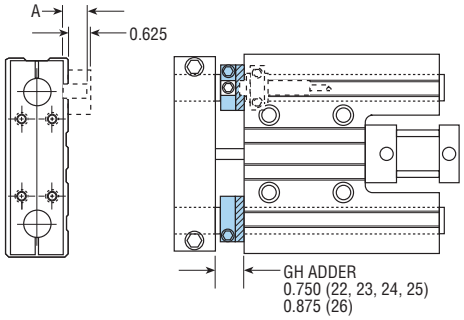

ADD TO BASIC SLIDE DIMENSIONS

All dimensions are reference only unless specifically toleranced.

## GH TRAVEL ADJUSTMENT AND SHOCK PADS ON RETRACTION

**with provisions for proximity switch mounting on retraction**

This option provides both travel adjustment and polyurethane shock pads on retraction with provisions for mounting of proximity switch targets and brackets in the retraction direction only. **Switches and bracket kits must be ordered separately.** See page 65 for bracket/target kits and for switch ordering information.

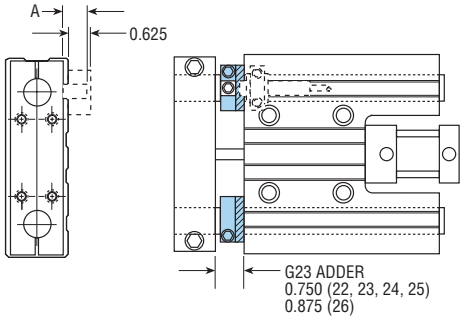



## G23 TRAVEL ADJUSTMENT AND HushStop SHOCK PADS ON RETRACTION

**with provisions for proximity switch mounting on retraction**

This option, quieter than the GH option, provides both travel adjustment and composite shock pads on retraction with provisions for mounting of proximity switch targets and brackets in the retraction direction only. **Switches and bracket kits must be ordered separately.** See page 65 for bracket/target kits and for switch ordering information.

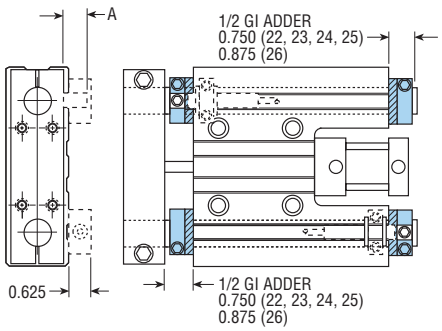
Due to the composite shock pads, stop locations may vary. For close tolerance stop locations, use the GH option.




## GI TRAVEL ADJUSTMENTS AND SHOCK PADS

**with provisions for proximity switches in both directions**

This option provides both travel adjustment and polyurethane shock pads in both directions with provisions for mounting of proximity switch targets and brackets on both ends. **Switches and bracket kits must be ordered separately.** See page 65 for bracket/target kits and for switch ordering information.




## G24 TRAVEL ADJUSTMENTS AND HushStop SHOCK PADS

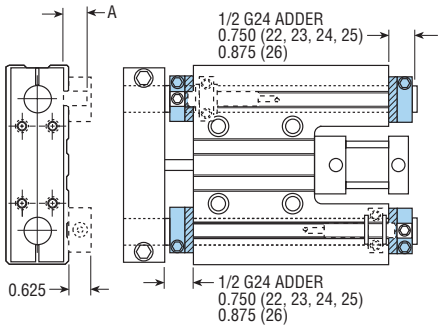
**with provisions for proximity switches in both directions**

This option,quieter than the GI option, provides both travel adjustment and composite shock pads in both directions with provisions for mounting of proximity switch targets and brackets on both ends. **Switches and bracket kits must be ordered separately.** See page 65 for bracket/target kits and for switch ordering information.

Due to the composite shock pads, stop locations may vary. For close tolerance stop locations, use the GI option.

| SLIDE SIZE | A | |
|---|---|---|
| | 8 mm PROX | 12 mm PROX |
| 22 | 0.700 | 1.500 |
| 23 | 0.700 | 1.500 |
| 24 | 0.700 | 1.000 |
| 25 | 0.700 | 1.000 |
| 26 | 0.830 | 1.125 |

ADD TO BASIC SLIDE DIMENSIONS




All dimensions are reference only unless specifically toleranced.

## Q1 CORROSION RESISTANT GUIDE SHAFTS

Extremely hard corrosion-resistant coating on the guide shafts for use in applications where moisture may corrode hardened ground shafts. End faces of the shafts remain uncoated. Consult PHD for fully coated shafts.

## V1 FLUOROELASTOMER SEALS

Fluoroelastomer seals are available for seal compatibility with certain fluids. Seal compatibility should be checked with the fluid manufacturer for proper application. Consult PHD for high temperature applications.

## Z1 ELECTROLESS NICKEL PLATING

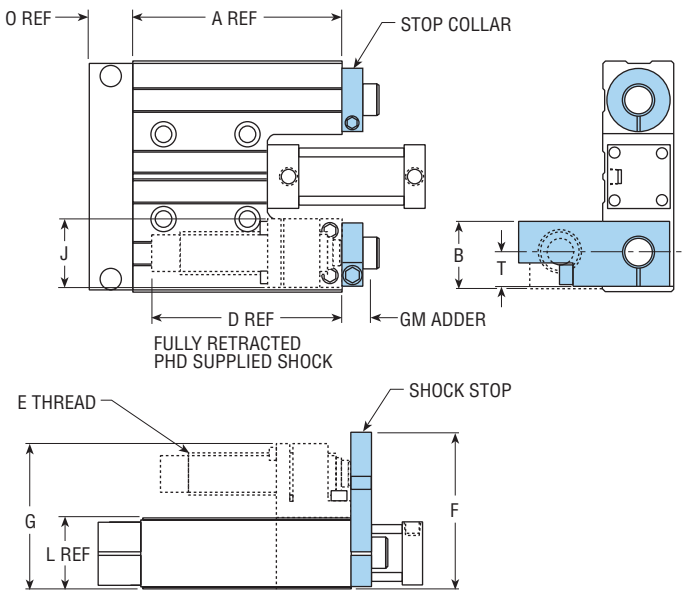
This option provides electroless nickel plating on all externally exposed ferrous parts except the guide shafts and cylinder rod end. This optional plating can be used for protecting the slide from severe or corrosive environments. The guide shafts can be made corrosion-resistant by specifying the -Q1 shaft option.

**NOTE:** Shock absorbers are not plated with -Z1 option.

## GM PROVISIONS FOR SHOCK ABSORBER MOUNTING ON EXTENSION

This option provides for mounting a bracket for a shock absorber in the extend direction. This includes mounting holes in the slide body, a shock stop on one shaft, and a stop collar on the other shaft. **The shock absorber and shock mounting kit must be ordered separately.** This arrangement allows the shock absorber to double as a travel adjustment in the extension direction.

See page 65 for shock mounting kit and shock absorber ordering information. Shock stop and mounting bracket are supplied ready for proximity switch bracket and target mounting.




ADD TO BASIC SLIDE DIMENSIONS

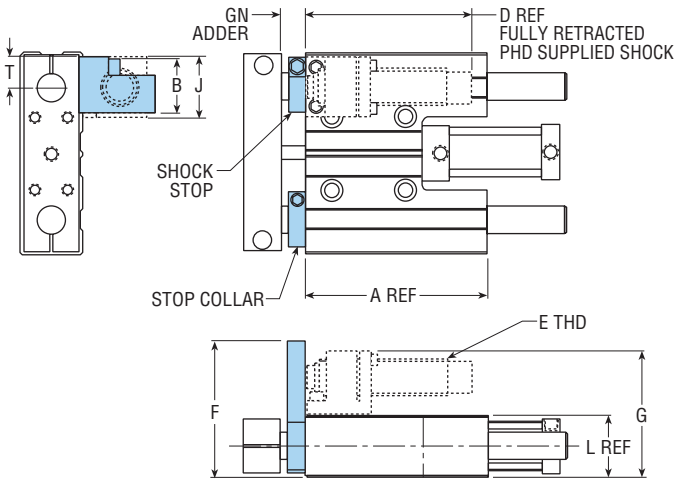
| SIZE | A REF. | | B | GM ADDER | D | E THREAD | F | G | J | L REF. | O REF. | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SD | SE | | | | | | | | | | |
| 22 | 2.390 | 4.140 | 1.000 | 0.750 | 4.00 | 3/4-16 UNF | 2.575 | 2.450 | 1.125 | 1.200 | 0.700 | 0.563 |
| 23 | 2.875 | 4.765 | 1.250 | 0.750 | 4.00 | 3/4-16 UNF | 2.875 | 2.750 | 1.125 | 1.500 | 0.950 | 0.695 |
| 24 | 3.390 | 5.015 | 1.500 | 0.750 | 4.75 | 1-12 UNF | 3.575 | 3.450 | 1.650 | 1.700 | 0.950 | 0.815 |
| 25 | 3.650 | 5.765 | 2.000 | 0.750 | 4.75 | 1-12 UNF | 4.075 | 3.950 | 1.650 | 2.200 | 1.200 | 1.050 |
| 26 | 5.000 | 8.000 | 2.500 | 0.875 | 4.75 | 1-12 UNF | 4.875 | 4.750 | 2.000 | 2.750 | 1.450 | 1.325 |

All dimensions are reference only unless specifically toleranced.

## GN PROVISIONS FOR SHOCK ABSORBER MOUNTING ON RETRACTION

This option provides for mounting a bracket for a shock absorber in the retract direction. This includes mounting holes in the slide body, a shock stop on one shaft, and a stop collar on the other shaft. **The shock absorber and shock mounting kit must be ordered separately.** This arrangement allows the shock absorber to double as a travel adjustment in the retraction direction.

See page 65 for shock mounting kit and shock absorber ordering information. Shock stop and mounting bracket are supplied ready for proximity switch bracket and target mounting.



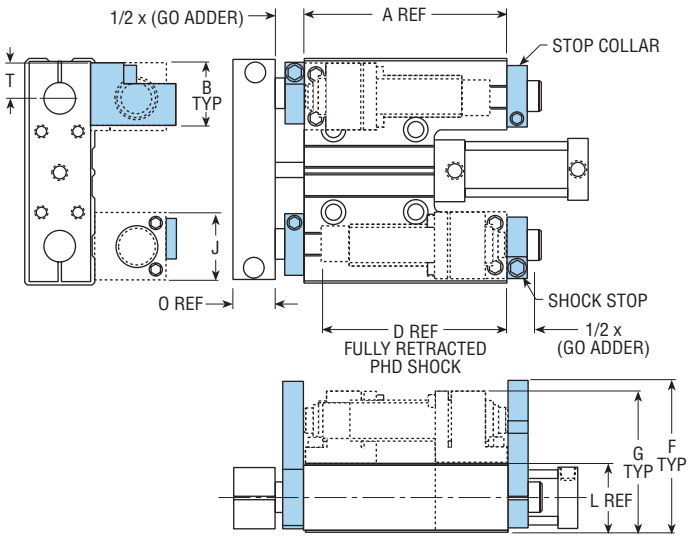

ADD TO BASIC SLIDE DIMENSIONS

| SIZE | A REF. | | B | GN ADDER | D | E THREAD | F | G | J | L REF. | T |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | SD | SE | | | | | | | | | |
| 22 | 2.390 | 4.140 | 1.000 | 0.750 | 4.00 | 3/4-16 UNF | 2.575 | 2.450 | 1.125 | 1.200 | 0.563 |
| 23 | 2.875 | 4.765 | 1.250 | 0.750 | 4.00 | 3/4-16 UNF | 2.875 | 2.750 | 1.125 | 1.500 | 0.695 |
| 24 | 3.390 | 5.015 | 1.500 | 0.750 | 4.75 | 1-12 UNF | 3.575 | 3.450 | 1.650 | 1.700 | 0.815 |
| 25 | 3.650 | 5.765 | 2.000 | 0.750 | 4.75 | 1-12 UNF | 4.075 | 3.950 | 1.650 | 2.200 | 1.050 |
| 26 | 5.000 | 8.000 | 2.500 | 0.875 | 4.75 | 1-12 UNF | 4.875 | 4.750 | 2.000 | 2.750 | 1.325 |

## GO PROVISIONS FOR SHOCK ABSORBER MOUNTING ON EXTENSION AND RETRACTION

This option provides for mounting brackets for shock absorbers in both the extend and retract direction. This includes two sets of mounting holes in the slide body, shock stops mounted on the shafts in each direction, and stop collars mounted on the opposite shafts. **The shock absorbers and shock mounting kits must be ordered separately.** This arrangement allows the shock absorbers to double as travel adjustments in both directions.

See page 65 for shock mounting kit and shock absorber ordering information. Shock stops and brackets are supplied ready for proximity switch bracket and target mounting.




ADD TO BASIC SLIDE DIMENSIONS

| SIZE | A REF. | | B | GO ADDER | D | E THREAD | F | G | J | L REF. | O REF. | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SD | SE | | | | | | | | | | |
| 22 | 2.390 | 4.140 | 1.000 | 1.500 | 4.000 | 3/4-16 UNF | 2.575 | 2.450 | 1.125 | 1.200 | 0.700 | 0.563 |
| 23 | 2.875 | 4.765 | 1.250 | 1.500 | 4.000 | 3/4-16 UNF | 2.875 | 2.750 | 1.125 | 1.500 | 0.950 | 0.695 |
| 24 | 3.390 | 5.015 | 1.500 | 1.500 | 4.750 | 1-12 UNF | 3.575 | 3.450 | 1.650 | 1.700 | 0.950 | 0.815 |
| 25 | 3.650 | 5.765 | 2.000 | 1.500 | 4.750 | 1-12 UNF | 4.075 | 3.950 | 1.650 | 2.200 | 1.200 | 1.050 |
| 26 | 5.000 | 8.000 | 2.500 | 1.750 | 4.750 | 1-12 UNF | 4.875 | 4.750 | 2.000 | 2.750 | 1.450 | 1.325 |

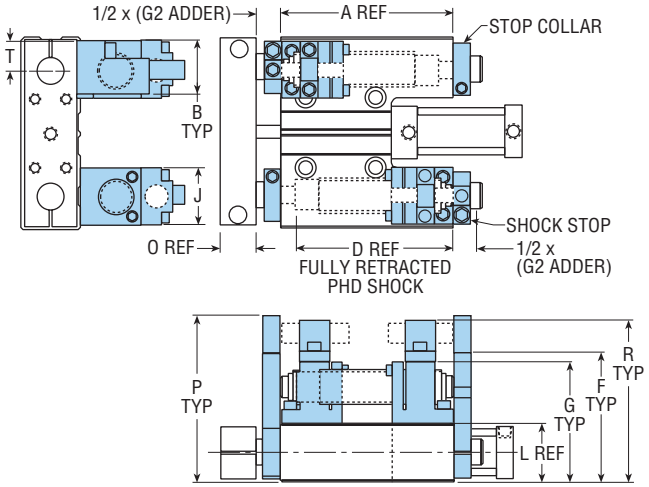
All dimensions are reference only unless specifically toleranced.

## G2 G12 SHOCK ABSORBER AND PROXIMITY SWITCH READY ON EXTENSION AND RETRACTION

This option provides mounting brackets for shock absorbers and proximity switches in both directions. This includes mounting brackets for both shock absorbers and proximity switches, proximity targets, and mounting hardware with stop collars and stops mounted on the shafts. **The shock absorbers and proximity switches must be ordered separately.** This arrangement allows the shock absorbers to double as travel adjustments in both directions. See page 65 for shock absorbers and proximity switches.

G2 = 8 mm proximity switch

G12 = 12 mm proximity switch




ADD TO BASIC SLIDE DIMENSIONS

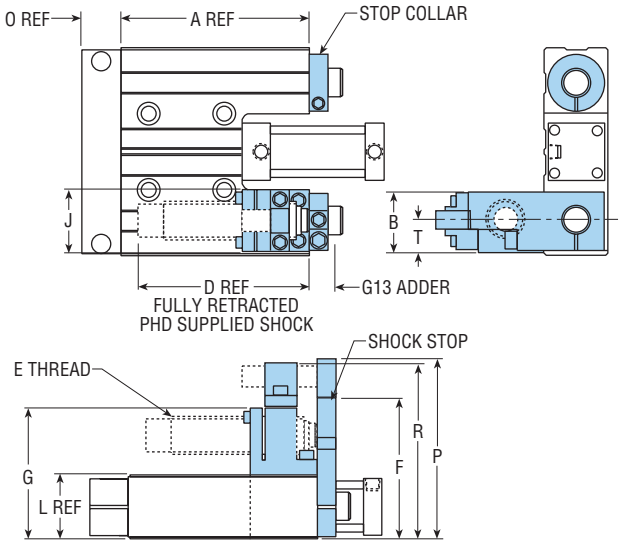
| SIZE | A REF. | | B | G2/G12 ADDER | D | E THREAD | F | G | J | L REF. | O REF. | P | | R | | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SD | SE | | | | | | | | | | 8 mm | 12 mm | 8 mm | 12 mm | |
| 22 | 2.390 | 4.140 | 1.000 | 1.500 | 4.000 | 3/4-16 UNF | 2.575 | 2.450 | 1.125 | 1.200 | 0.700 | 3.275 | 4.075 | 3.075 | 3.700 | 0.563 |
| 23 | 2.875 | 4.765 | 1.250 | 1.500 | 4.000 | 3/4-16 UNF | 2.875 | 2.750 | 1.125 | 1.500 | 0.950 | 3.575 | 4.375 | 3.375 | 4.000 | 0.695 |
| 24 | 3.390 | 5.015 | 1.500 | 1.500 | 4.750 | 1-12 UNF | 3.575 | 3.450 | 1.650 | 1.700 | 0.950 | 4.275 | 4.575 | 4.075 | 4.330 | 0.815 |
| 25 | 3.650 | 5.765 | 2.000 | 1.500 | 4.750 | 1-12 UNF | 4.075 | 3.950 | 1.650 | 2.200 | 1.200 | 4.775 | 5.075 | 4.575 | 4.830 | 1.050 |
| 26 | 5.000 | 8.000 | 2.500 | 1.750 | 4.750 | 1-12 UNF | 4.875 | 4.750 | 2.000 | 2.750 | 1.450 | 5.705 | 6.000 | 5.375 | 5.625 | 1.325 |

## G3 G13 SHOCK ABSORBER and PROXIMITY SWITCH READY ON EXTENSION

This option provides mounting brackets for a shock absorber and proximity switch on the extension only. This includes mounting brackets for both shock absorber and proximity switch, a proximity target and mounting hardware, with a stop collar and stop on the shafts. **The shock absorber and proximity switch must be ordered separately.** This arrangement allows the shock absorber to double as a travel adjustment in the extension direction. See page 65 for shock absorbers and proximity switches.

G3 = 8 mm Proximity Switch

G13 = 12 mm Proximity Switch




ADD TO BASIC SLIDE DIMENSIONS

| SIZE | A REF. | | B | G3/G13 ADDER | D | E THREAD | F | G | J | L REF. | O REF. | P | | R | | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SD | SE | | | | | | | | | | 8 mm | 12 mm | 8 mm | 12 mm | |
| 22 | 2.390 | 4.140 | 1.125 | 0.750 | 4.00 | 3/4-16 UNF | 2.575 | 2.450 | 1.125 | 1.200 | 0.700 | 3.275 | 4.075 | 3.075 | 3.700 | 0.563 |
| 23 | 2.875 | 4.765 | 1.250 | 0.750 | 4.00 | 3/4-16 UNF | 2.875 | 2.750 | 1.125 | 1.500 | 0.950 | 3.575 | 4.375 | 3.375 | 4.000 | 0.695 |
| 24 | 3.390 | 5.015 | 1.500 | 0.750 | 4.75 | 1-12 UNF | 3.575 | 3.450 | 1.650 | 1.700 | 0.950 | 4.275 | 4.575 | 4.075 | 4.330 | 0.815 |
| 25 | 3.650 | 5.765 | 2.000 | 0.750 | 4.75 | 1-12 UNF | 4.075 | 3.950 | 1.650 | 2.200 | 1.200 | 4.775 | 5.075 | 4.575 | 4.830 | 1.050 |
| 26 | 5.000 | 8.000 | 2.500 | 0.875 | 4.75 | 1-12 UNF | 4.875 | 4.750 | 2.000 | 2.750 | 1.450 | 5.705 | 6.000 | 5.375 | 5.625 | 1.325 |

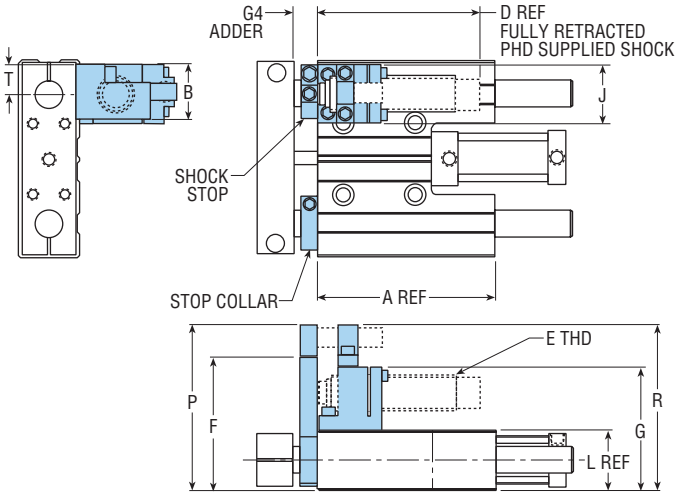
All dimensions are reference only unless specifically toleranced.

## G4 G14 SHOCK ABSORBER and PROXIMITY SWITCH READY ON RETRACTION

This option provides mounting brackets for a shock absorber and proximity switch on the retraction only. This includes mounting brackets for both shock absorber and proximity switch, shaft, a proximity target and mounting hardware, with a stop collar and stop on the other shafts. **The shock absorber and proximity switch must be ordered separately.** This arrangement allows the shock absorber to double as a travel adjustment in the retract direction. See page 65 for shock absorbers and proximity switches.

G4 = 8 mm Proximity Switch

G14 = 12 mm Proximity Switch




ADD TO BASIC SLIDE DIMENSIONS

| SIZE | A REF. | | B | G4/G14 ADDER | D | E THREAD | F | G | J | REF. | P | | R | | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SD | SE | | | | | | | | | 8 mm | 12 mm | 8 mm | 12 mm | |
| 22 | 2.390 | 4.140 | 1.125 | 0.750 | 4.00 | 3/4-16 UNF | 2.575 | 2.450 | 1.125 | 1.200 | 3.275 | 4.075 | 3.075 | 3.700 | 0.563 |
| 23 | 2.875 | 4.765 | 1.250 | 0.750 | 4.00 | 3/4-16 UNF | 2.875 | 2.750 | 1.125 | 1.500 | 3.575 | 4.375 | 3.375 | 4.000 | 0.695 |
| 24 | 3.390 | 5.015 | 1.500 | 0.750 | 4.75 | 1-12 UNF | 3.575 | 3.450 | 1.650 | 1.700 | 4.275 | 4.575 | 4.075 | 4.330 | 0.815 |
| 25 | 3.650 | 5.765 | 2.000 | 0.750 | 4.75 | 1-12 UNF | 4.075 | 3.950 | 1.650 | 2.200 | 4.775 | 5.075 | 4.575 | 4.830 | 1.050 |
| 26 | 5.000 | 8.000 | 2.500 | 0.875 | 4.75 | 1-12 UNF | 4.875 | 4.750 | 2.000 | 2.750 | 5.705 | 6.000 | 5.375 | 5.625 | 1.325 |

## SHOCK ABSORBERS and KITS

**Shock absorbers are ordered separately** and should be properly matched to the slide application. Each shock mounting kit contains one shock bracket with all necessary hardware for mounting one shock absorber in either direction. Slide unit must be ordered as provisions for shock absorber. See pages 51, 52, 53, and 65 for proper shock absorber selection and shock and kit numbers.

## BS SHOCK PADS ON EXTENSION

The -BS option adds shock pads on extension to the -GM, -GO, -G2, -G3, -G12, or -G13 shock absorber option. The shock pads are assembled between the shock stop (stop collar) and the slide body. The purpose of this option is to complement the shock absorber by eliminating metal to metal contact at the end of slide extension. Shock pads do not affect length adders for shock absorber options.

## BT SHOCK PADS ON RETRACTION

The -BT option adds shock pads on retraction to the -GN, -GO, -G2, -G4, -G12, or -G14 shock absorber option. The shock pads are assembled between the shock stop (stop collar) and the slide body. The purpose of this option is to complement the shock absorber by eliminating metal to metal contact at the end of slide retraction. Shock pads do not affect length adders for shock absorber options.

## BK HushStop SHOCK PADS ON EXTENSION

The -BK option adds composite shock pads on extension to the -GM, -GO, -G2, -G3, -G12, or -G13 shock absorber option. The shock pads are assembled between the shock stop (stop collar) and the slide body. The purpose of this option, quieter than the -BS option, is to complement the shock absorber by eliminating metal to metal contact at the end of slide extension. Shock pads do not affect length adders for shock absorber options.

Due to the composite shock pads, stop locations may vary. For close tolerance stop locations, use the -BS option.

## BL HushStop SHOCK PADS ON RETRACTION

The -BL option adds composite shock pads on retraction to the -GN, -GO, -G2, -G4, -G12, or -G14 shock absorber option. The shock pads are assembled between the shock stop (stop collar) and the slide body. The purpose of this option, quieter than the -BT option, is to complement the shock absorber by eliminating metal to metal contact at the end of slide retraction. Shock pads do not affect length adders for shock absorber options.

Due to the composite shock pads, stop locations may vary. For close tolerance stop locations, use the -BT option.

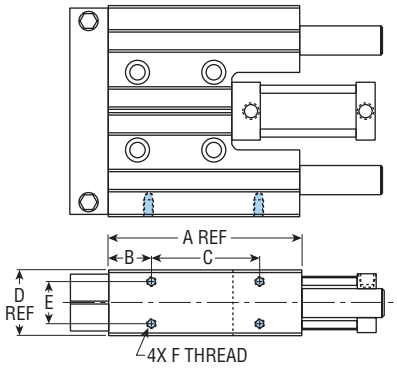
All dimensions are reference only unless specifically toleranced.

## GV SIDE MOUNTING HOLES IN POSITION 2

This option provides an additional mounting pattern on one side of the slide body. This pattern is ideal if the slide is to be mounted on edge for applications where a narrow profile is required.

### OPTION ADDERS

| MODEL | A | B | C | D | E | F THREAD |
|---|---|---|---|---|---|---|
| SDx22 | 2.390 | 0.750 | 0.625 | 1.200 | 0.750 | 10-24 x 0.375 DP |
| SEx22 | 4.140 | 0.750 | 2.375 | 1.200 | 0.750 | 10-24 x 0.375 DP |
| SDx23 | 2.875 | 0.937 | 0.875 | 1.500 | 1.062 | 1/4-20 x 0.375 DP |
| SEx23 | 4.765 | 0.937 | 2.875 | 1.500 | 1.062 | 1/4-20 x 0.375 DP |
| SDx24 | 3.390 | 1.063 | 1.125 | 1.700 | 1.125 | 1/4-20 x 0.430 DP |
| SEx24 | 5.015 | 1.063 | 2.875 | 1.700 | 1.125 | 1/4-20 x 0.430 DP |
| SDx25 | 3.650 | 1.313 | 0.875 | 2.200 | 1.500 | 3/8-16 x 0.650 DP |
| SEx25 | 5.765 | 1.313 | 3.125 | 2.200 | 1.500 | 3/8-16 x 0.650 DP |
| SDx26 | 5.000 | 1.500 | 2.000 | 2.750 | 2.000 | 3/8-16 x 0.750 DP |
| SEx26 | 8.000 | 1.500 | 5.000 | 2.750 | 2.000 | 3/8-16 x 0.750 DP |




**NOTE:** MTG HOLES CENTERED ON CENTERLINE OF UNIT

## H47 RODLOK SLIDE & RODLOK

PHD's Rodlok is ideal for locking the tool plate while in a static/ stationary position. When the pressure is removed from the port of the Rodlok, the mechanism will grip the piston rod of the cylinder and prevent it from moving. The loads are held indefinitely without power. Rodlok performance is application and environment sensitive (cleanliness of rod or Rodlok will also affect performance). THE RODLOK IS NOT DESIGNED TO BE USED AS A PERSONAL SAFETY DEVICE.

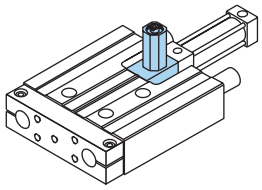
| SIZE | STATIC LOCKING FORCE* lb | STATIC LOCKING FORCE* N |
|---|---|---|
| 22 | 40 | 180 |
| 23 | 56 | 250 |
| 24 | 79 | 350 |
| 25 | 135 | 600 |
| 26 | 338 | 1500 |

**NOTE:** *Locking force given in table is the actual locking force with a dry clean rod and does not include any safety factor.

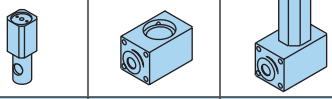
### OPERATING PRESSURE

The operating pressure for the locking device is different than the operating pressure for the slide to which it is attached. The locking device of the Rodlok is designed with an operating pressure range of 60 psi [4 bar] minimum to 150 psi [10 bar] maximum. The Series SD/SE Slide with a Rodlok attached has an operating pressure range of 45 psi [3 bar] minimum to 150 psi [10 bar] maximum.

**NOTE:** When ordering a replacement cylinder (-H4), Rodlok must be ordered separately.



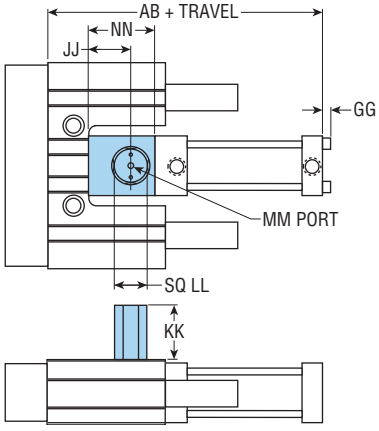
### REPLACEMENT RODLOK KITS



| MODEL NO. | LOCKING DEVICE KIT | ADAPTOR KIT* | COMPLETE RODLOK* |
|---|---|---|---|
| SDx22 | 64476 | 63931-06 | 63935-06 |
| SEx22 | 64476 | 63931-07 | 63935-07 |
| SD/SEx23 | 64477 | 63931-08 | 63935-08 |
| SD/SEx24 | 64478 | 63931-09 | 63935-09 |
| SD/SEx25 | 64479 | 63931-10 | 63935-10 |
| SD/SEx26 | 64480 | 63931-05 | 63935-05 |

**NOTES:**
1) *Kits ship with cylinder mounting hardware.
2) Part numbers listed above are intended for replacement purposes only and are to be used specifically on slides with the -H47 option.

The Rodlok locking device and adaptor can be purchased separately as kits. See chart above. The locking device and adaptor are not available with a corrosion resistant (-Z1 option) finish.




| BORE in | DEVICE WEIGHT lb | ADAPTOR WEIGHT lb | TOTAL WEIGHT lb |
|---|---|---|---|
| SD/SEx22 | 0.10 | 0.10 | 0.22 |
| SD/SEx23 | 0.14 | 0.18 | 0.35 |
| SD/SEx24 | 0.14 | 0.22 | 0.41 |
| SD/SEx25 | 0.20 | 0.40 | 0.70 |
| SD/SEx26 | 0.58 | 0.70 | 1.54 |

**NOTE:** Total weight includes rod adder for -H46/-H47 cylinder.

| LETTER DIM. | MODEL NUMBER SDxx22 | SExx22 | SDxx23 | SExx23 | SDxx24 | SExx24 | SDxx25 | SExx25 | SDxx26 | SExx26 |
|---|---|---|---|---|---|---|---|---|---|---|
| GG | — | — | — | — | — | — | 0.265 | 0.265 | 0.322 | 0.322 |
| KK | 1.309 | 1.309 | 1.336 | 1.336 | 1.236 | 1.236 | 1.459 | 1.459 | 1.912 | 1.912 |
| LL | 0.728 | 0.728 | 0.787 | 0.787 | 0.787 | 0.787 | 0.886 | 0.886 | 1.279 | 1.279 |
| MM | 10-32 | 10-32 | 10-32 | 10-32 | 10-32 | 10-32 | 10-32 | 10-32 | 1/8 NPT | 1/8 NPT |
| NN | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.750 | 1.750 | 3.000 | 3.000 |
| JJ | 0.875 | 0.875 | 0.875 | 0.875 | 0.875 | 0.875 | 0.750 | 0.750 | 1.299 | 1.299 |
| AB | 4.570 | 6.320 | 4.760 | 6.760 | 5.250 | 7.010 | 6.104 | 8.354 | 8.346 | 11.346 |

All dimensions are reference only unless specifically toleranced.

## SWITCHES & BRACKETS
**(for use with -E or -M options)**

***See Switches and Sensors section for complete switch specifications.***

### JC1 SWITCH MOUNTING BRACKET

| SLIDE SIZE | BRACKET NO. |
|---|---|
| 22 | 92100 |
| 23 | |
| 24 | |
| 25 | 92101 |
| 26 | |

**NOTE:** Brackets are ordered separately.

### SERIES JC1xDx MAGNETIC SWITCHES

| PART NO. | DESCRIPTION |
|---|---|
| JC1RDU-5 | PNP or NPN DC Reed, 5 meter cable |
| JC1RDU-K | PNP or NPN DC Reed, Quick Connect |
| JC1ADU-K | AC Reed, Quick Connect (M12) |
| JC1HDP-5 | PNP (Source), Radial Sensing, 5 meter cable |
| JC1HDP-K | PNP (Source), Radial Sensing, Quick Connect |
| JC1HDN-5 | NPN (Sink), Radial Sensing, 5 meter cable |
| JC1HDN-K | NPN (Sink), Radial Sensing, Quick Connect |

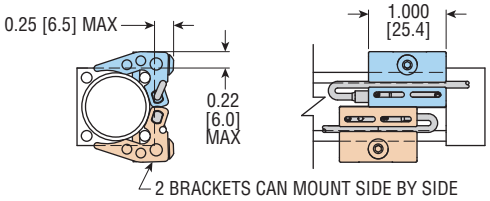
**NOTE:** Switches must be ordered separately.

### CORDSETS FOR SERIES JC1xDx SWITCHES

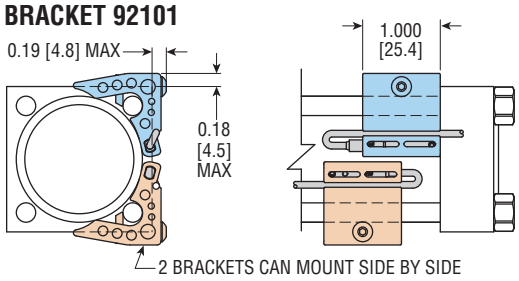
| PART NO. | DESCRIPTION |
|---|---|
| 63549-02 | M8, 3 pin, Straight Female Connector, 2 meter cable |
| 63549-05 | M8, 3 pin, Straight Female Connector, 5 meter cable |
| 81284-1-010 | M12, 4 pin, Straight Female Connector, 2 meter cable |

**NOTE:** Cordsets are ordered separately.

### SWITCH BRACKET 92100




### SWITCH BRACKET 92101




### SERIES JC1ST TWO POSITION TEACHABLE MAGNETIC SWITCHES

| PART NO. | DESCRIPTION |
|---|---|
| JC1STP-2 | PNP (Source), Solid State, 12-30 VDC, 2 meter cable |
| JC1STP-K | PNP (Source), Solid State, 12-30 VDC, Quick Connect |

**NOTE:** Switches must be ordered separately.

### CORDSET FOR SERIES JC1ST SWITCHES

| PART NO. | DESCRIPTION |
|---|---|
| 81284-1-001 | M8, 4 pin, Straight Female Connector, 5 meter cable |

**NOTE:** Cordsets are ordered separately.

## PROXIMITY SWITCH BRACKET AND TARGET KITS
**(for use with proper -Gxxx option)**

***See Switches and Sensors section for complete switch specifications.***

Each kit contains a bracket, target, and hardware for mounting one threaded proximity switch on an SD or SE Slide. Switches must be ordered separately.

***Slides must be ordered with provisions for proximity switches in order for these bracket and target kits to function. See individual proximity and switch ready options for switch dimensions.***

**12 mm proximity switches are customer supplied.**

### PROXIMITY SWITCHES

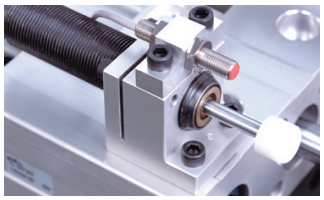
| PART NO. | DESCRIPTION |
|---|---|
| 51422-005-02 | 8 mm Inductive Proximity Switch NPN (Sink), 10-30 VDC, 2 m cable |
| 51422-006-02 | 8 mm Inductive Proximity Switch PNP (Source), 10-30 VDC, 2 m cable |

### PROXIMITY SWITCH BRACKET AND TARGET KITS

| SLIDE SIZE | SWITCH SIZE | |
|---|---|---|
| | 8 mm | 12 mm |
| 22 | 53101-01-1 | 63998-01-1 |
| 23 | 53101-01-1 | 63998-01-1 |
| 24 | 53101-02-1 | 63998-02-1 |
| 25 | 53101-02-1 | 63998-02-1 |
| 26 | 53101-03-1 | 63998-03-1 |

Kit contains all components for standard non-Z1 unit for one direction only.

## SHOCK ABSORBERS
See individual shock ready options for shock absorber dimensions.



| SLIDE SIZE | PHD SHOCK ABSORBER NUMBER* |
|---|---|
| 22 | 57057-02-x |
| 23 | 57057-02-x |
| 24 | 57057-03-x |
| 25 | 57057-03-x |
| 26 | 57057-03-x |

*See PHD product sizing software or pages 51 to 53 for proper shock selection.

| SLIDE SIZE | PHD SHOCK MOUNTING KIT |
|---|---|
| 22 | 54108-11 |
| 23 | 54108-11 |
| 24 | 54109-11 |
| 25 | 54109-11 |
| 26 | 54110-11 |

Kit contains components for standard non -Z1 units for one direction only.